Managing Insecticide Resistance in Onion Thrips

Wisconsin Fertilizer, Aglime and Pest Management Conference

Vegetable Crop Management

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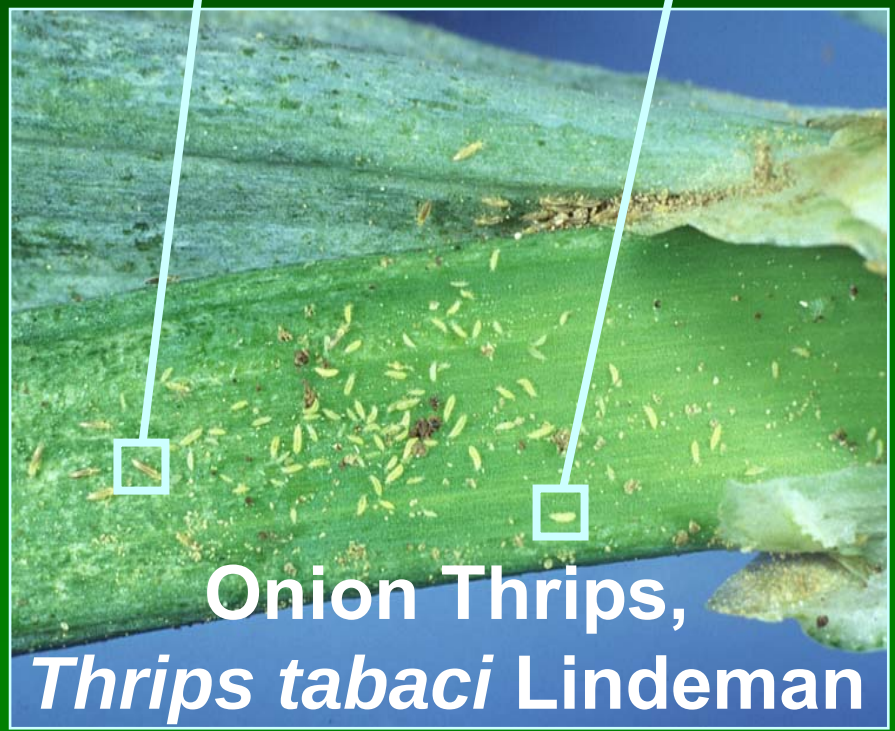
The problem and the pest…

Onion Thrips Damage

Adult

Larva



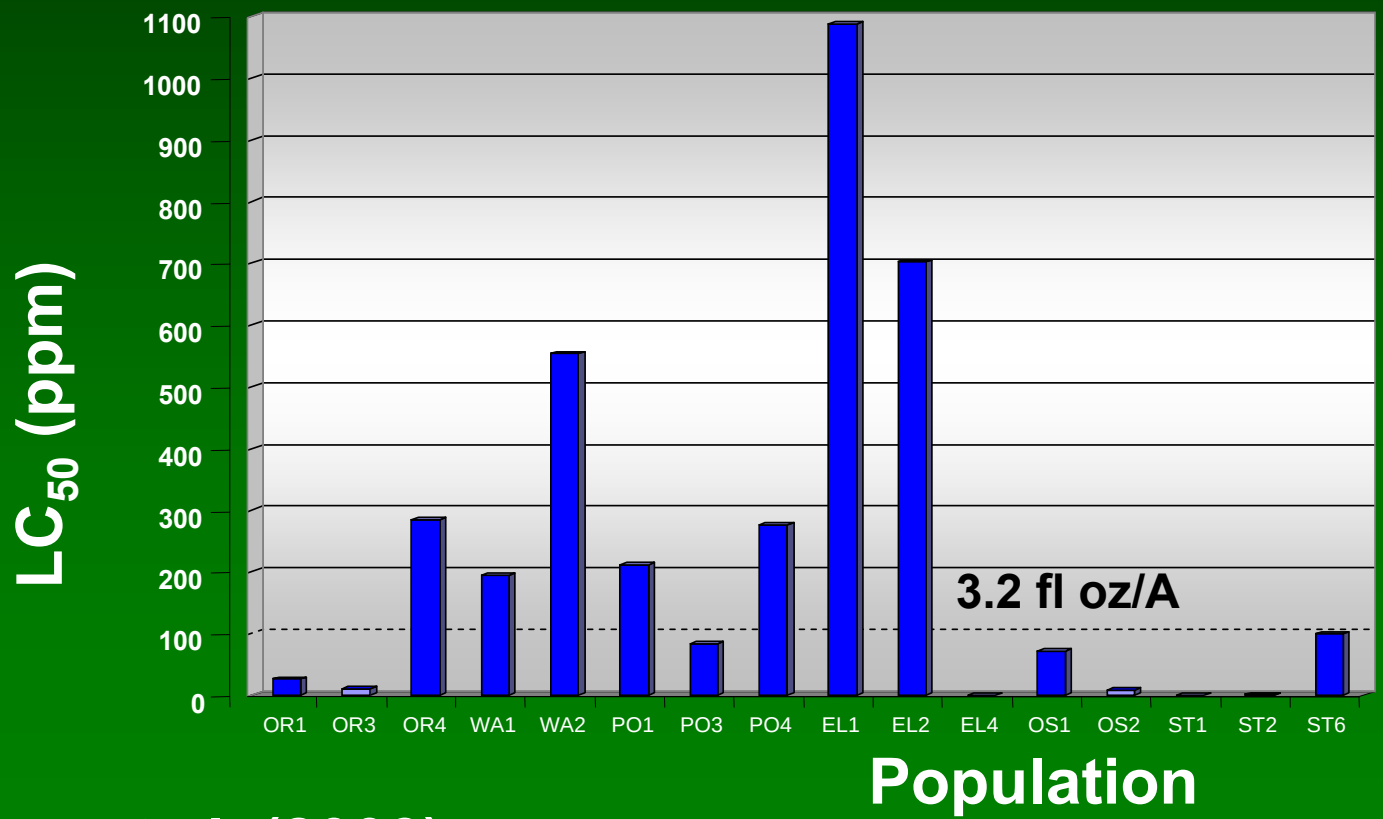
Onion Thrips,
Thrips tabaci Lindeman

Biological attributes that make onion thrips a pest

- Short developmental time
- 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 resistance to Warrior® λ-cyhalothrin (New York)

2001 TIBS Bioassays among populations



Shelton et al. (2003)

Insecticide Control Failures in Wisconsin are more Frequent Because…?

- **Populations in Wisconsin may be resistant to Warrior®, similar to NY populations.**

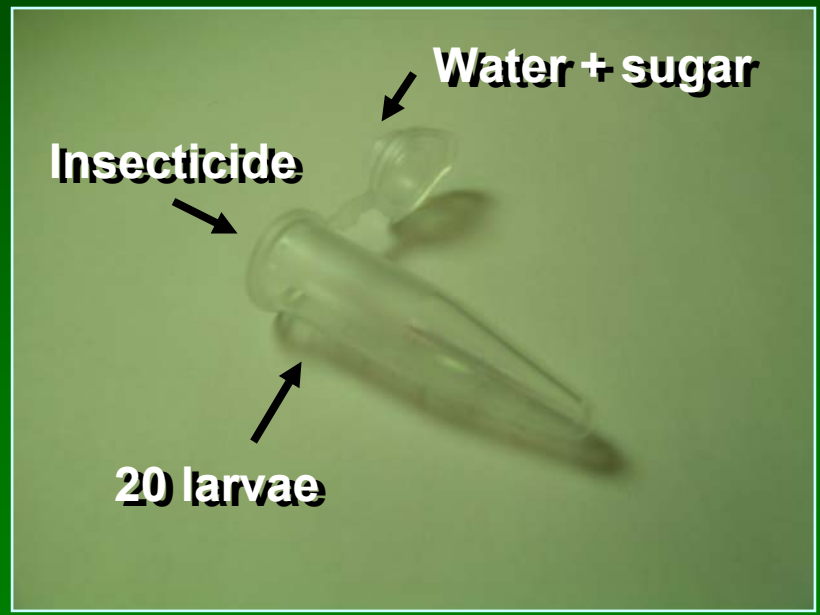
  - ✓ **Environmental conditions become hot and dry.**
  - ✓ **Spray coverage may be inadequate.**
  - ✓ **Application threshold adjustments.**

TIBS Survey for Insecticide Resistance

- **Expose thrips to insecticides in the lab to avoid issues such as:**

(1) inadequate spray coverage

(2) environmental conditions that could affect control



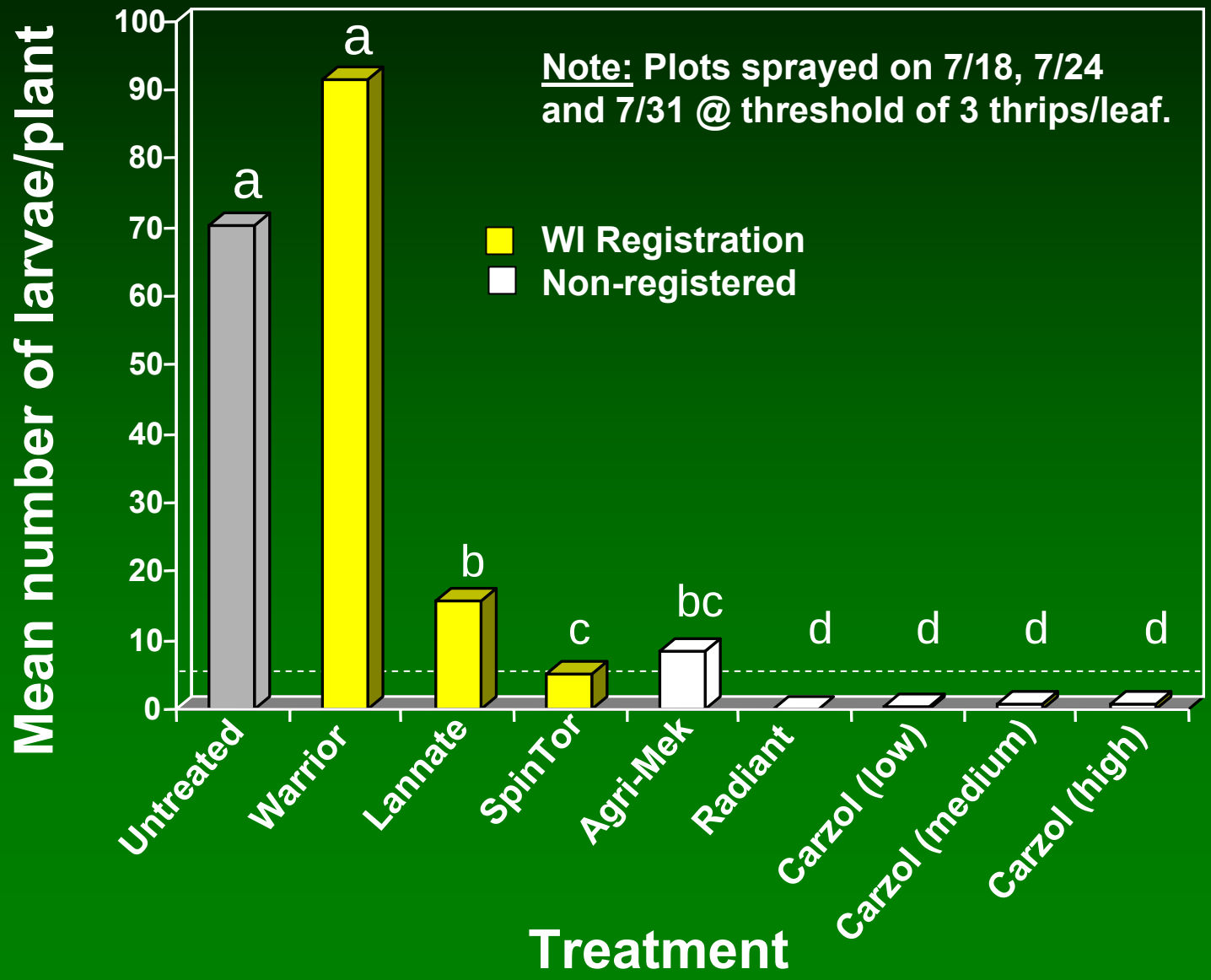
Foliar-Applied Insecticides Evaluated in 2006

Product	Active Ingredient	Rate (amnt/acre)
Warrior	lambda-cyhalothrin	3.8 fl oz
Lannate LV	methomyl	48 fl oz
SpinTor 2SC	spinosad	6 fl oz
*Carzol SP	formetanate hydrocloride	0.75, 1 and 1.5 lbs
Radiant SC	spinetoram	7 fl oz
Agri-Mek 0.15EC	abamectin	10 fl oz

Note: Products highlighted in yellow were labeled on onion in WI in 2006; *Carzol was permitted for use in NY and OR under a Crisis Exemption, and in MI and CO under a Section 18.

Nault (2006) Arth. Mgmt. Tests

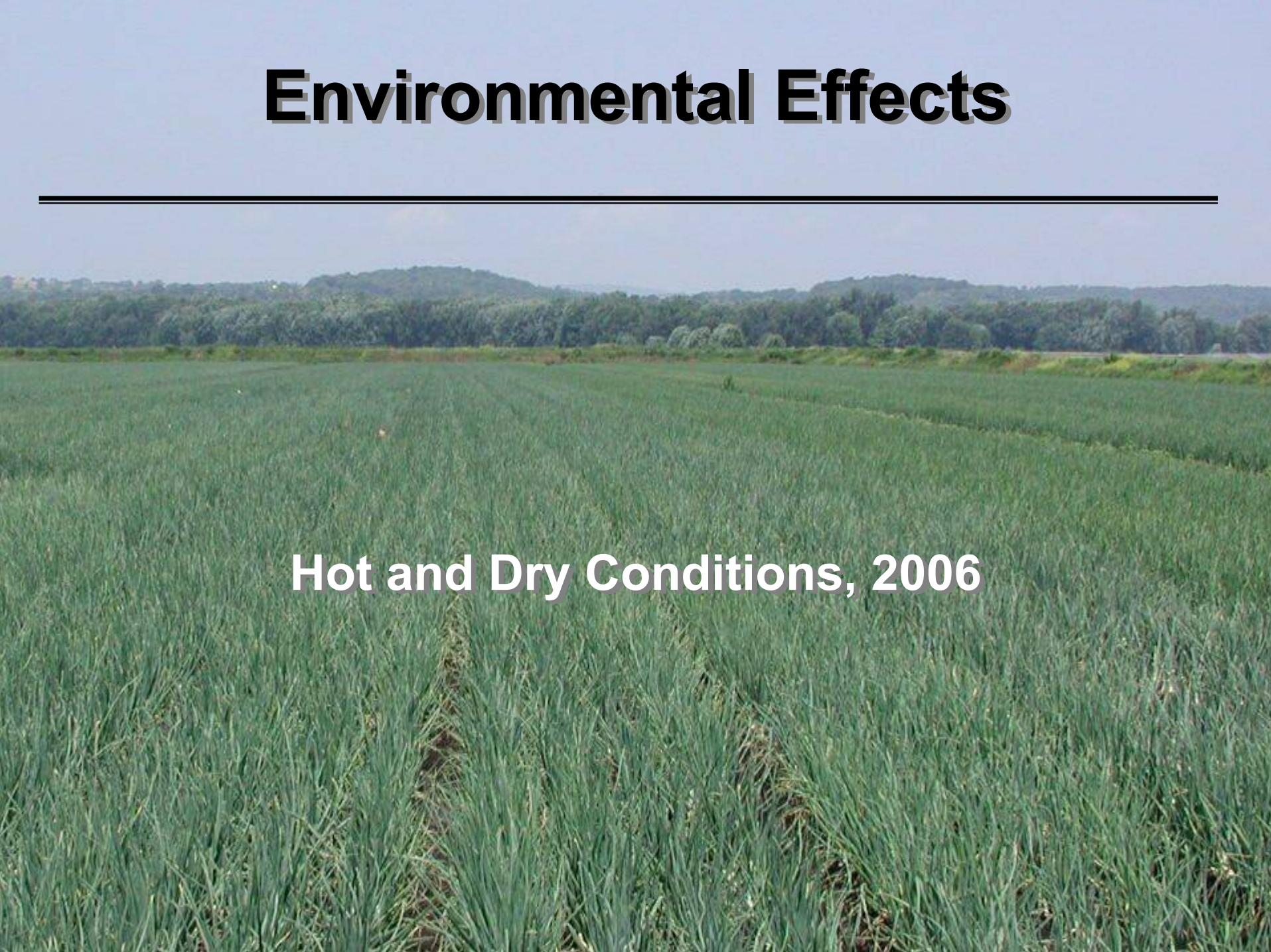
Foliar-Applied Insecticides for Onion Thrips Control



Summary
Foliar-Applied Insecticides

- Onions were best protected from onion thrips damage using Carzol and Radiant
- SpinTor, Agri-Mek and Lannate provided adequate or nearly adequate levels of protection
- Warrior failed to control thrips
- Highly efficacious insecticides must be registered soon in WI to prevent further thrips outbreaks

Environmental Effects



Onion thrips survival, fecundity, and generation time(s) at varying temperatures

	Days		
Factor	68^0 F	77^0 F	86^0 F
Survival	47	25	13
Eggs laid/ female	210	165	63
Generation time	48	30	17

Murai (2000)

Onion thrips population growth (68ºF)

	Number of Females		
Date	68^0 F		
July 1	1		
July 8			
July 15			
July 22			
July 29			
August 5			
August 12			
August 19	210		
August 26			
September 2			
Number generations	1		

Murai (2000)

Onion thrips population growth (77°F)

	Number of Females		
Date	68^0 F	77^0 F	
July 1	1	1	
July 8			
July 15			
July 22			
July 29		165	
August 5			
August 12			
August 19	210		
August 26			
September 2		27,225	
Number generations	1	2	

Murai (2000)

Onion thrips population growth (86ºF)

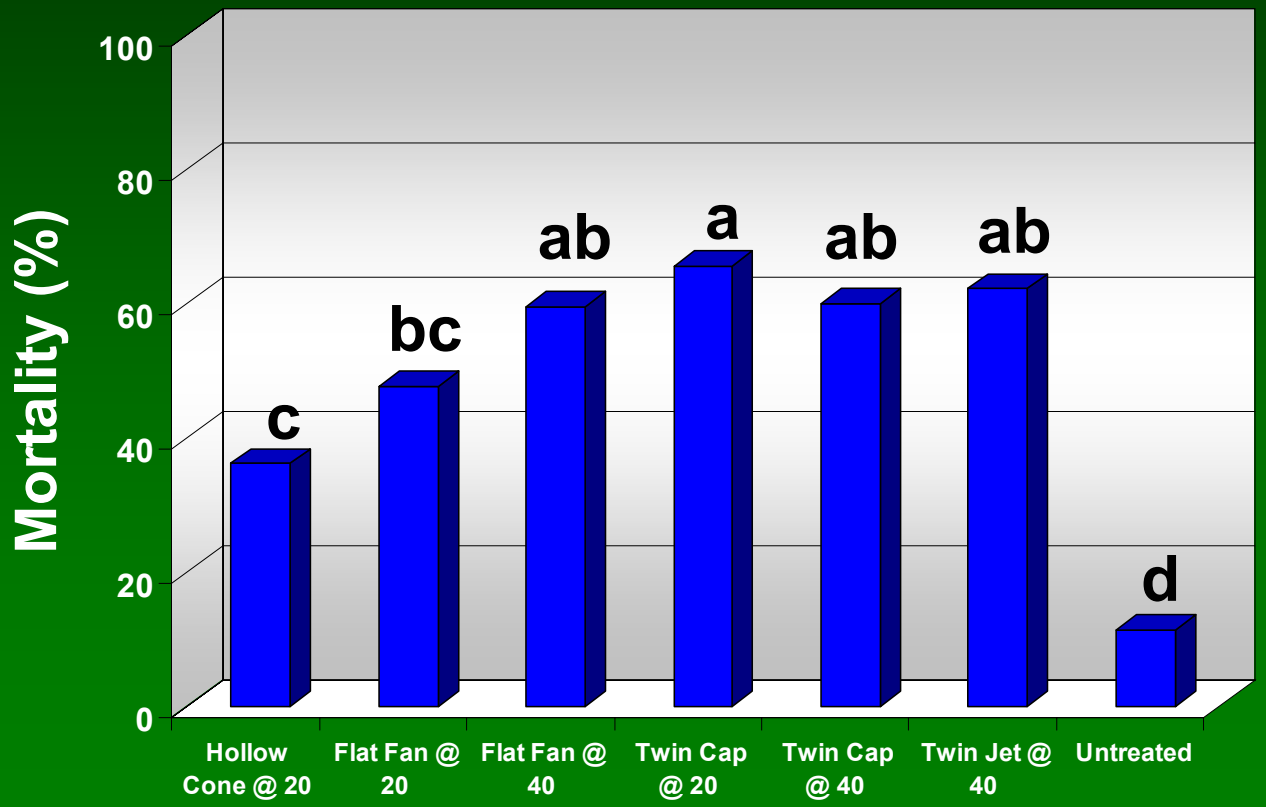
	Number of Females		
Date	68^0 F	77^0 F	86^0 F
July 1	1	1	1
July 8			
July 15			63
July 22			
July 29		165	3,969
August 5			
August 12			250,047
August 19	210		
August 26			15,752,961
September 2		27,225	
Number generations	1	2	4

Murai (2000)

Spray Coverage an Issue??

Spray Nozzles and Gallonage

- Better coverage of middle and bottom portions of plant using Flat Fan, Twin Caps and Twin Jet nozzles @ 40 gpa.



Shelton et al. (2003)

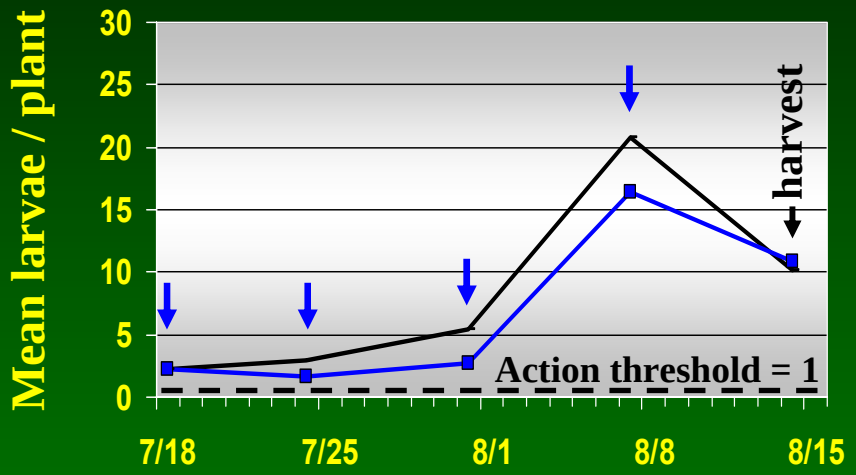
Adjusting Action Thresholds??

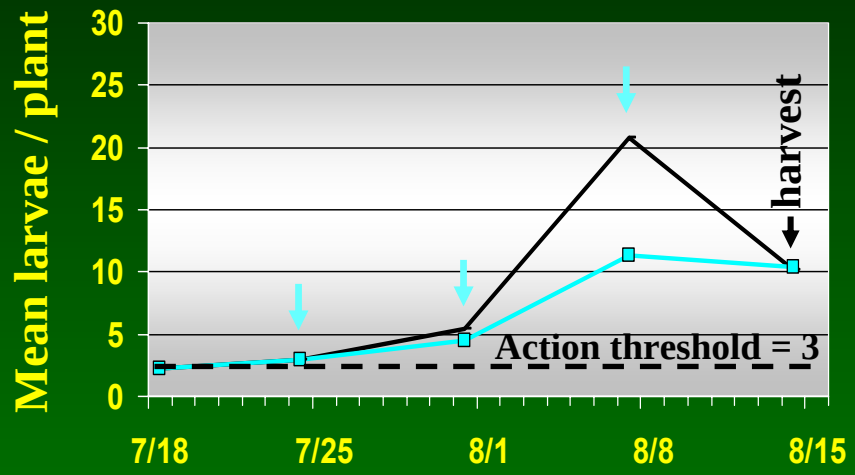
B. Nault, 2007 *Pacific Northwest Vegetable Association Conference & Trade Show*

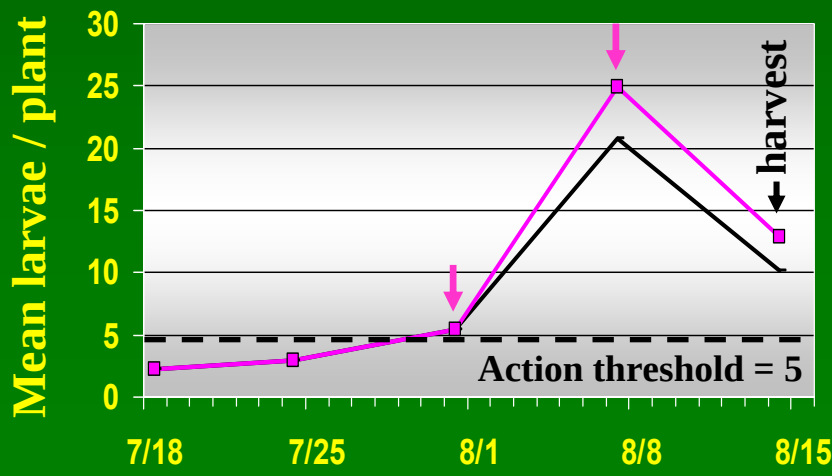
Product	Action Threshold	Rate (amnt/acre)
Warrior	1 larva/leaf	3.8 fl oz
Warrior	* 3 larvae/leaf	
Warrior	5 larvae/leaf	
Carzol SP	1 larva/leaf	0.75 lb
Carzol SP	* 3 larvae/leaf	
Carzol SP	5 larvae/leaf	

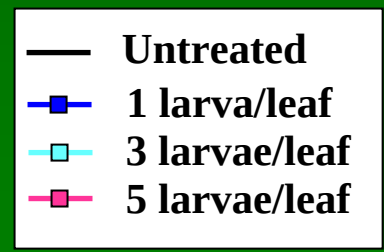
*** Current onion thrips management action threshold, Michigan State University**

Onion Thrips Control using Warrior® at 3 action thresholds

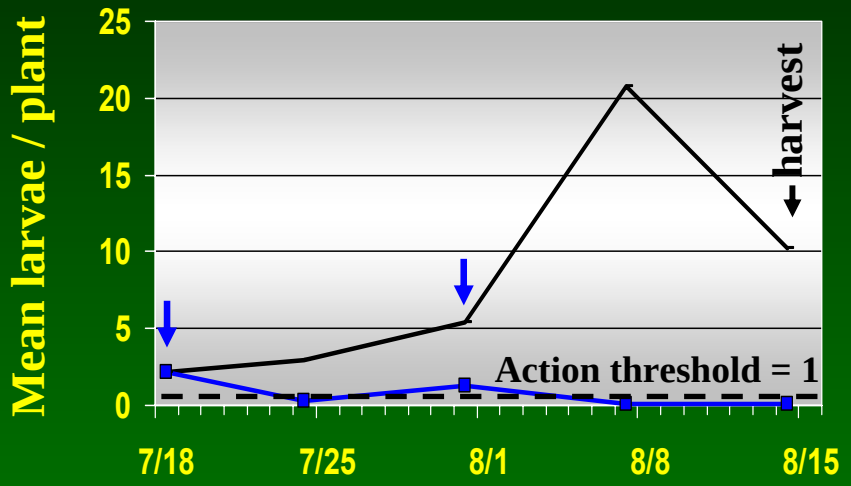


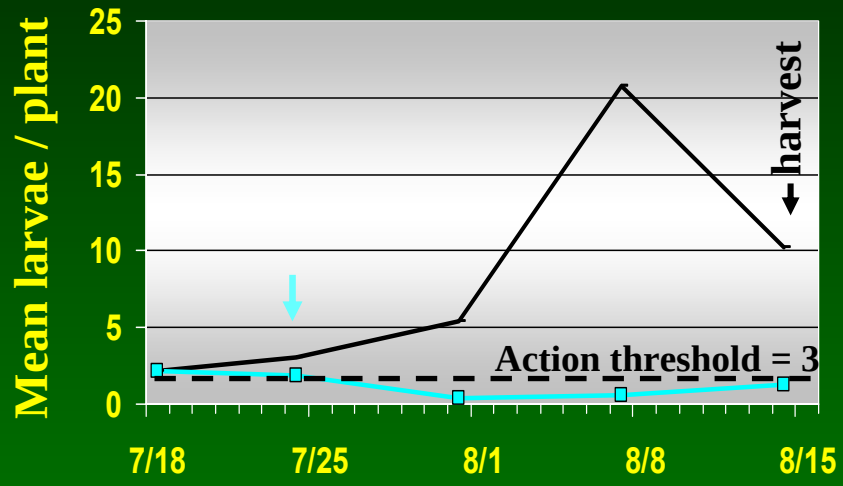


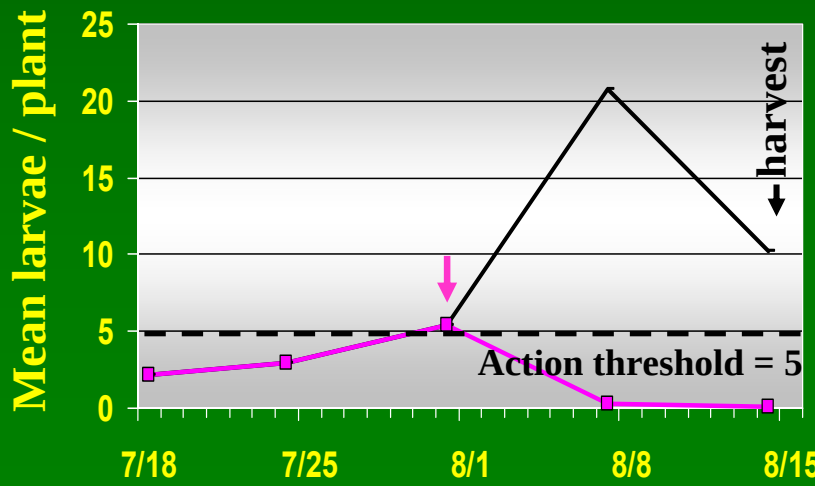


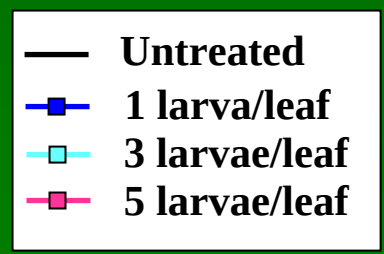


Onion Thrips Control using Carzol SP® at 3 action thresholds









Action Thresholds Summary

- Combination of insecticide product and action threshold used to time sprays affects control
- Warrior failed, regardless of the action threshold
- Carzol sprayed at 1 and 3 thrips/leaf provided excellent control; *only 1 spray required at the 3 thrips/leaf threshold
- Spraying at 5 thrips/leaf allowed too much damage

Insecticide Control Options

- Rotate insecticides (classes if possible)
  - e.g., spinosad, pyrethroid, carbamate, organophosphate, carbamate
- Two successive applications of one product to control a generation
- Time applications based on most appropriate threshold
- Avoid tank mixing insecticides

Insecticide control failures could be reduced by:

1. Monitoring onion thrips populations for resistance

2. Using a nozzle and gallonage that provides better coverage

3. Using insecticides belonging to new classes

4. Adopting insecticide resistance management – rotating classes of chemistry

Questions?