



University of  
Massachusetts  
Amherst

## Research Update Meeting 2009 - Insect Update

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# **Insect update**

## **MA cranberry insect management**

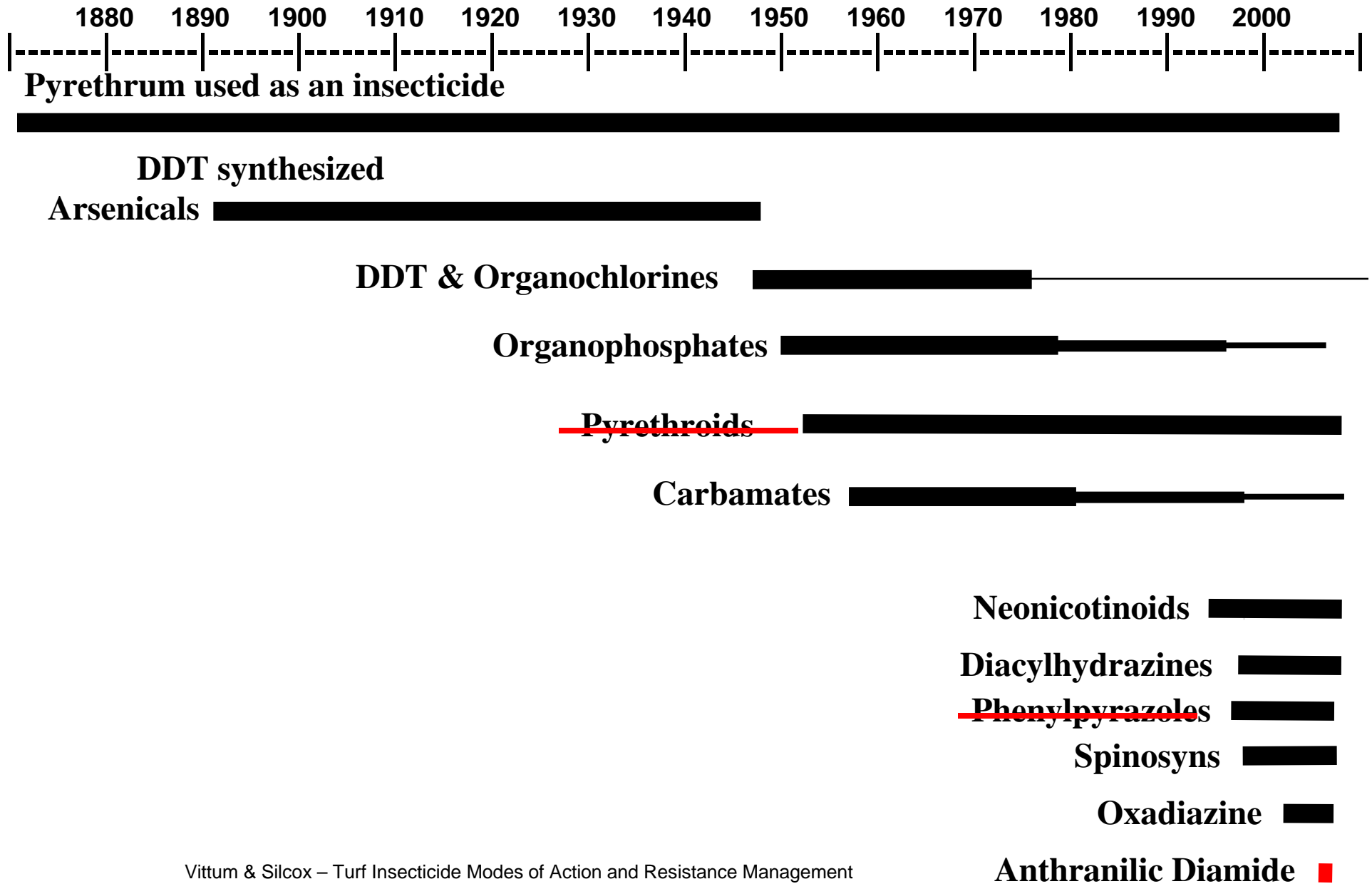
**AL Averill & MM Sylvia**  
**University of Massachusetts**

# Outline

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- New insecticide chemistries
- Screening trials
  - Cranberry fruitwor
- Fruitworm spray-timing issues for
  - Ben Lear, Stevens
- Status of honey bees and CCD

# Insecticide Development History —cranberry view



# Neonicotinoids

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- Fairly new class of insecticides similar to nicotine
- Widely adopted
- “Systemic” --move into plant
- Often long residual

# Neonicotinoids in cranberry

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- Already labelled
  - Actara (thiamethoxam)
  - Admire (imidacloprid)
  - Assail (acetimidiprid)
- Neo 1
  - moving along, our work done, residue analysis ongoing. Likely Zone II restrictions
- Neo 2
  - registration pending
  - post-bloom application only



# Molting hormone mimic--Intrepid

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- Insects molt to grow
- Coordinated by hormones
- Intrepid interferes with process by mimicking action of molting hormone



# Spinosyns

- **Delegate**—spinetoram
  - Derived from fermentation of soil bacterium
  - Longer residual than SpinTor



# Anthranilic diamides

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- Rytania (plant extract) has been used as an insecticide for about 50 years
- The extract contains several structurally-related compounds, including ryanodine
- Ryanodine causes paralysis in insects by sustained contraction of muscles
- targets the calcium channel
- Ryanodine activates the calcium release channel of the sarcoplasmic reticulum

# Anthranilic diamides

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- Three possibilities in cranberry
  - one moving through registration process
  - one stalled (indefinitely?)
  - one just started to move through registration process

# Overview, new compounds

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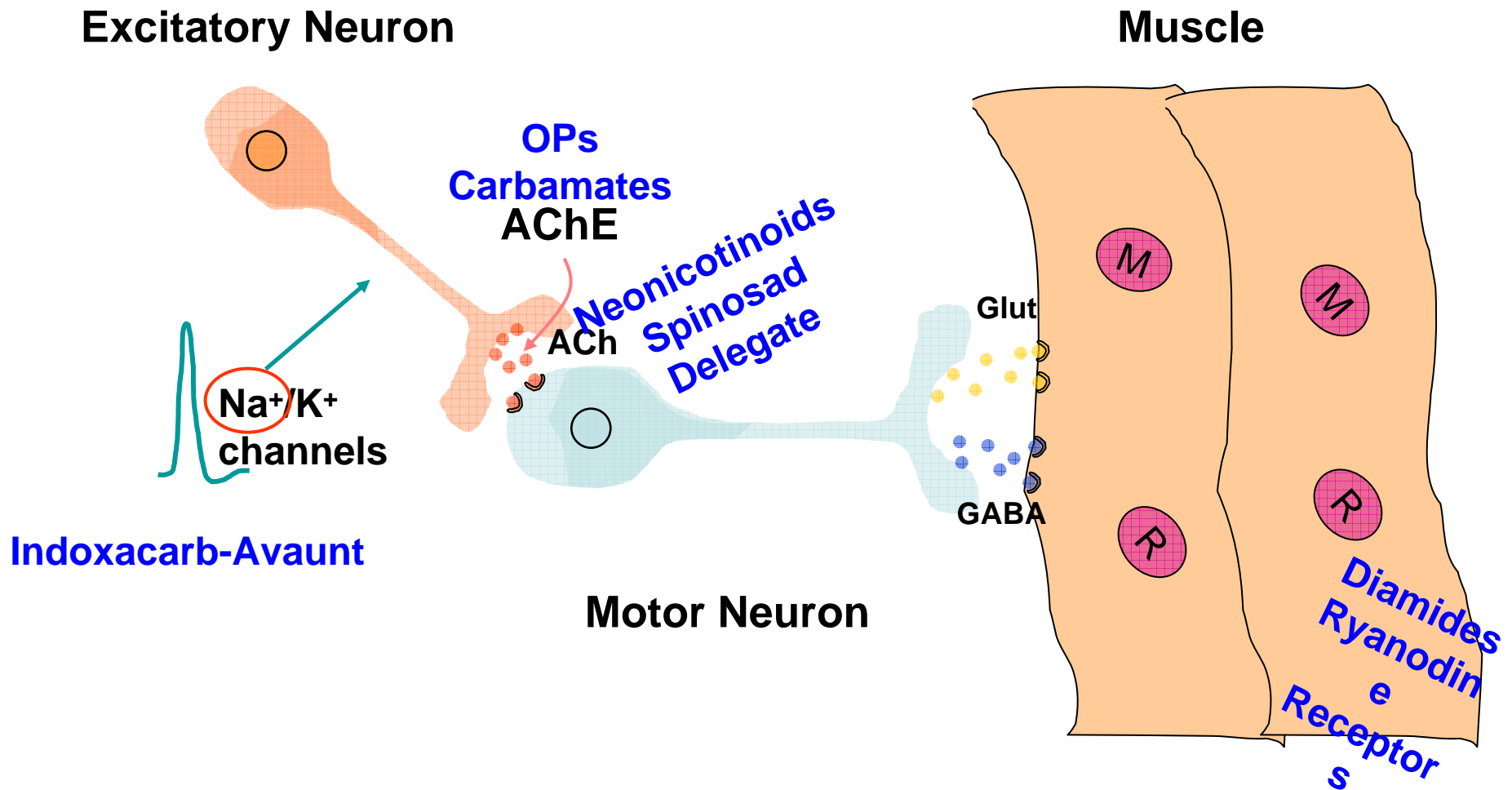
- Some v. good options
- Usually reduced risk
  - Very low mammalian toxicity
  - Low ecotoxicity
  - Low application rate
  - Selectivity
- Often good residual, often systemic

# Overview

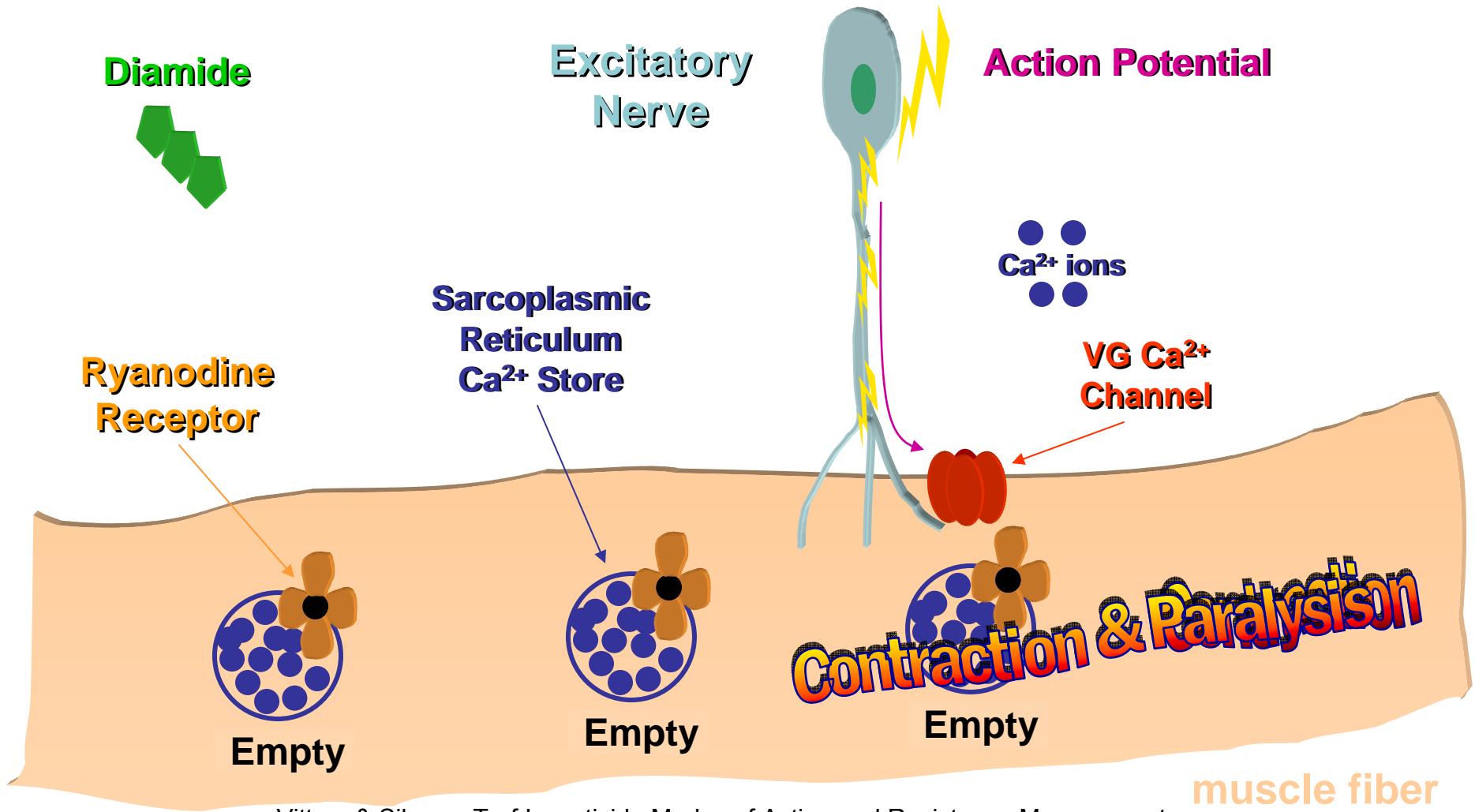
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- Activity!
- Mode of action >> target site in pest
- Nerve/muscle systems targeted by most of the new compounds we're looking at:
  - Nervous
    - Neonicotinoids
    - Avaunt
    - Spinosyns (Delegate)
  - Muscular
    - Diamides (newer chemistry)

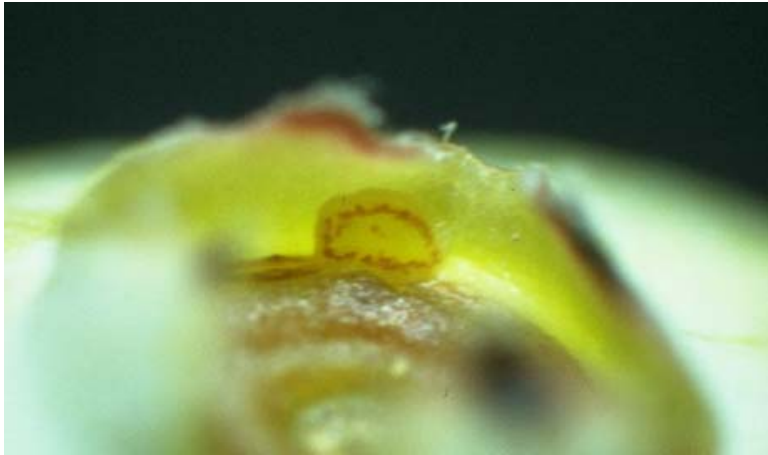
# Insecticide Neuromuscular Targets



# Anthranilic diamide----mode of action



# 1. Screening program:cranberry fruitworm and new insecticides





# Worked at EB abandoned bed with mega-infestation of fruitworm



# Field trial: methods

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- 5 replicates/treatment
- 150 gal/A with CO<sub>2</sub> backpack sprayer
- Two applications
  - 7/10 and 7/19
- Fruit randomly sampled after second spray

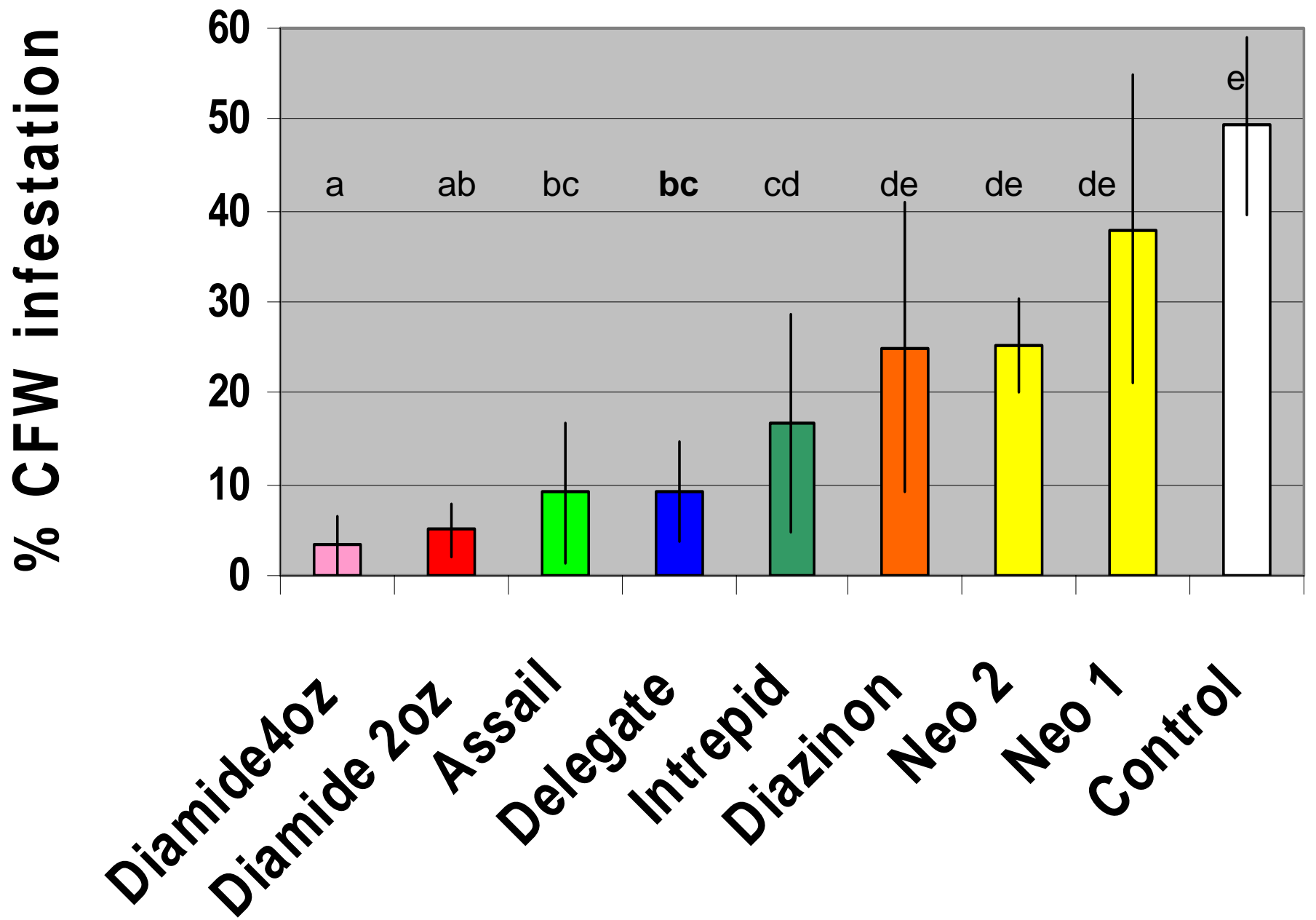


First spray: timing based on out-of-bloom counts  
Second spray: 9 days later



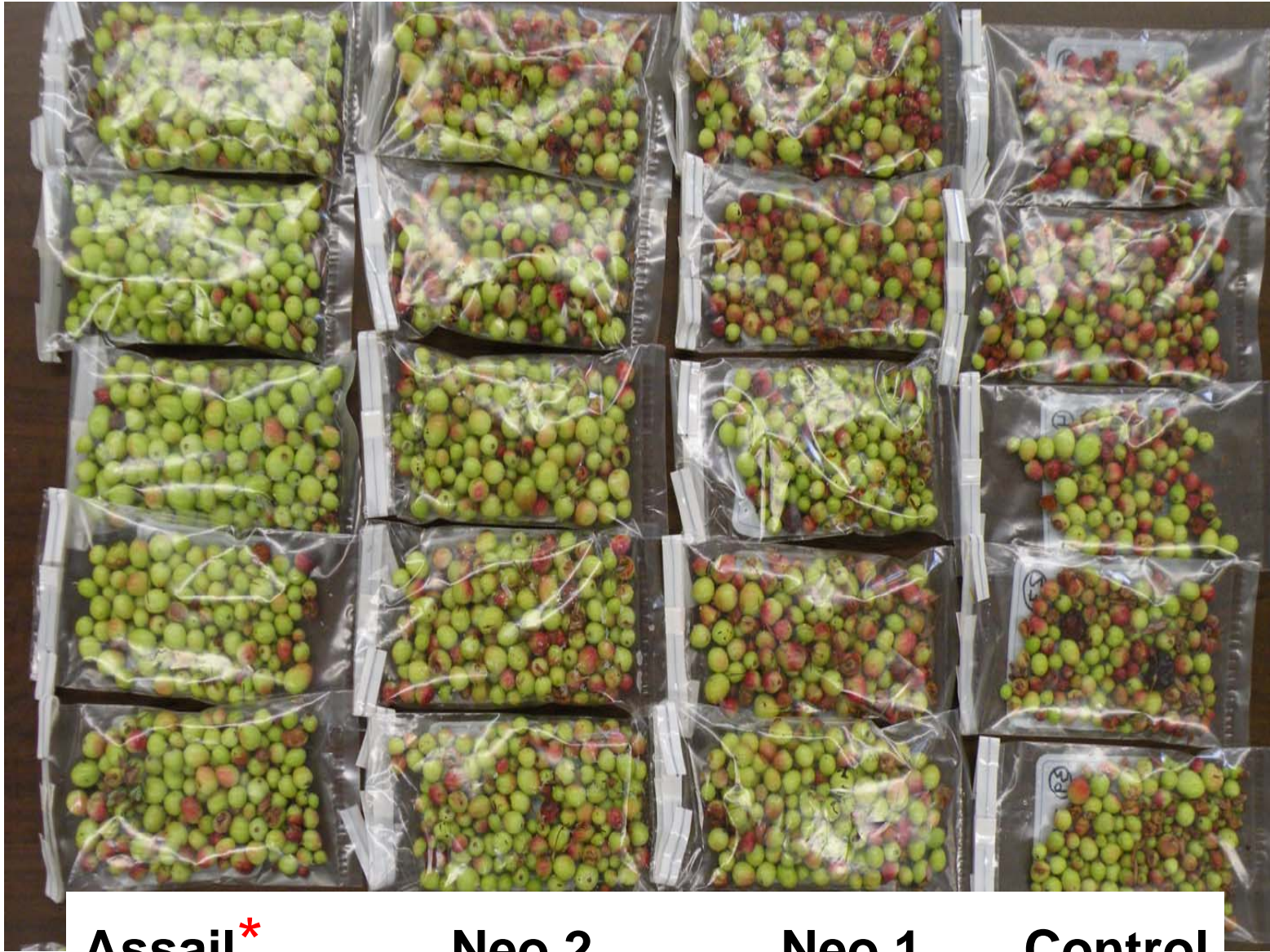
# Treatments

- 3 neonicotinoids
  - **Assail, Neo 1, Neo 2**
- Molting hormone mimic
  - **Intrepid**
- 1 anthranilic diamide
  - 2 rates: **Diamide 2 oz** and **Diamide 4 oz**
- New spinosyn
  - **Delegate**
- Industry standard
  - **Diazinon**
- Control--untreated





# Comparison of neonicotinoids



**Assail\***

**Neo 2**

**Neo 1**

**Control**





**Delegate**

**Diamide  
4 oz**

**Intrepid**

**Diamide  
2 oz**

**Diazinon**



# 6 DAT



# Yellow-headed fireworm raging on plots



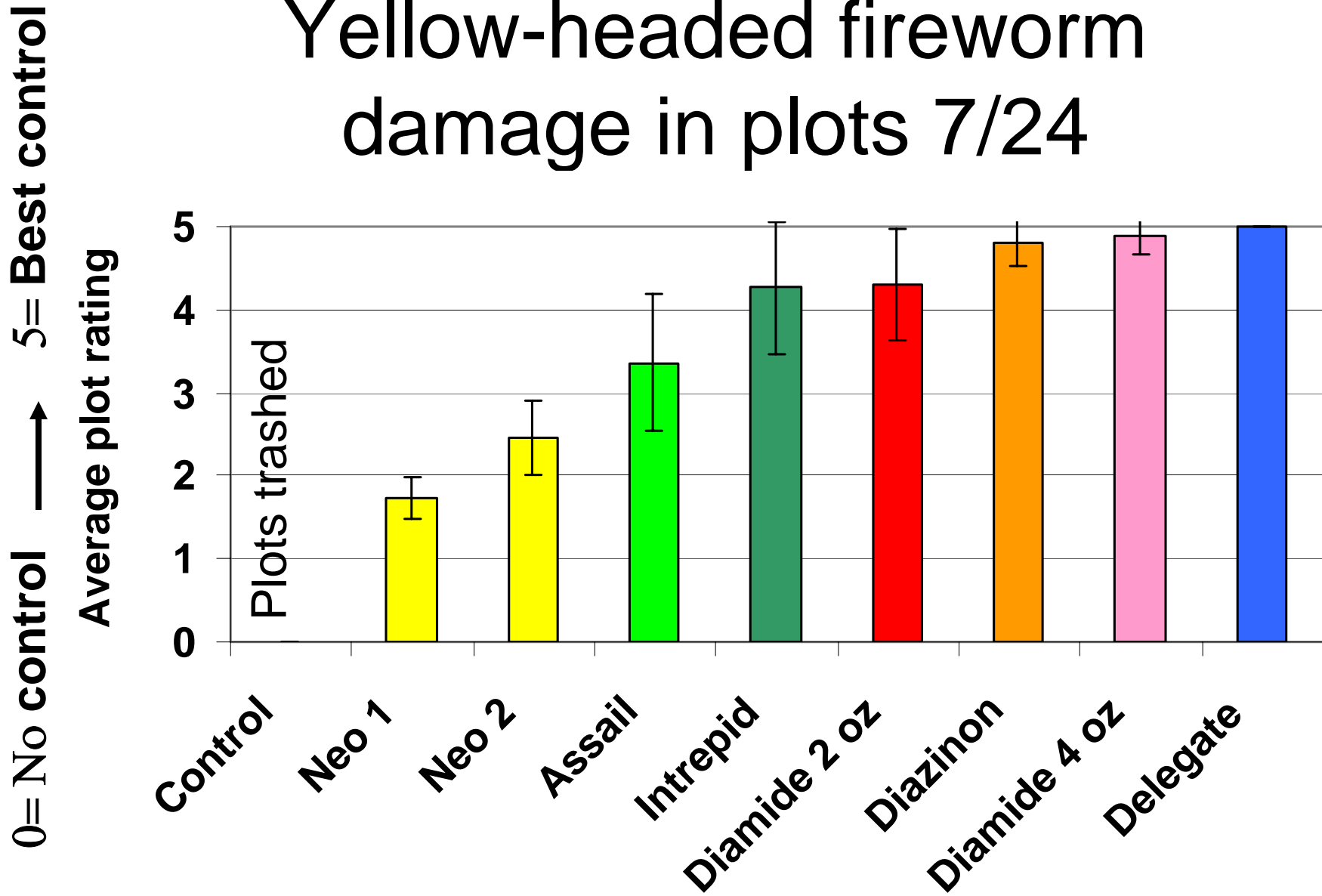
# Yellow headed fireworm damage

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- Visual assessment of plots
- 6 days after second spray
- Rating system from 0 to 5
  - 0 = no control
  - 5 = good control



# Yellow-headed fireworm damage in plots 7/24



# Control





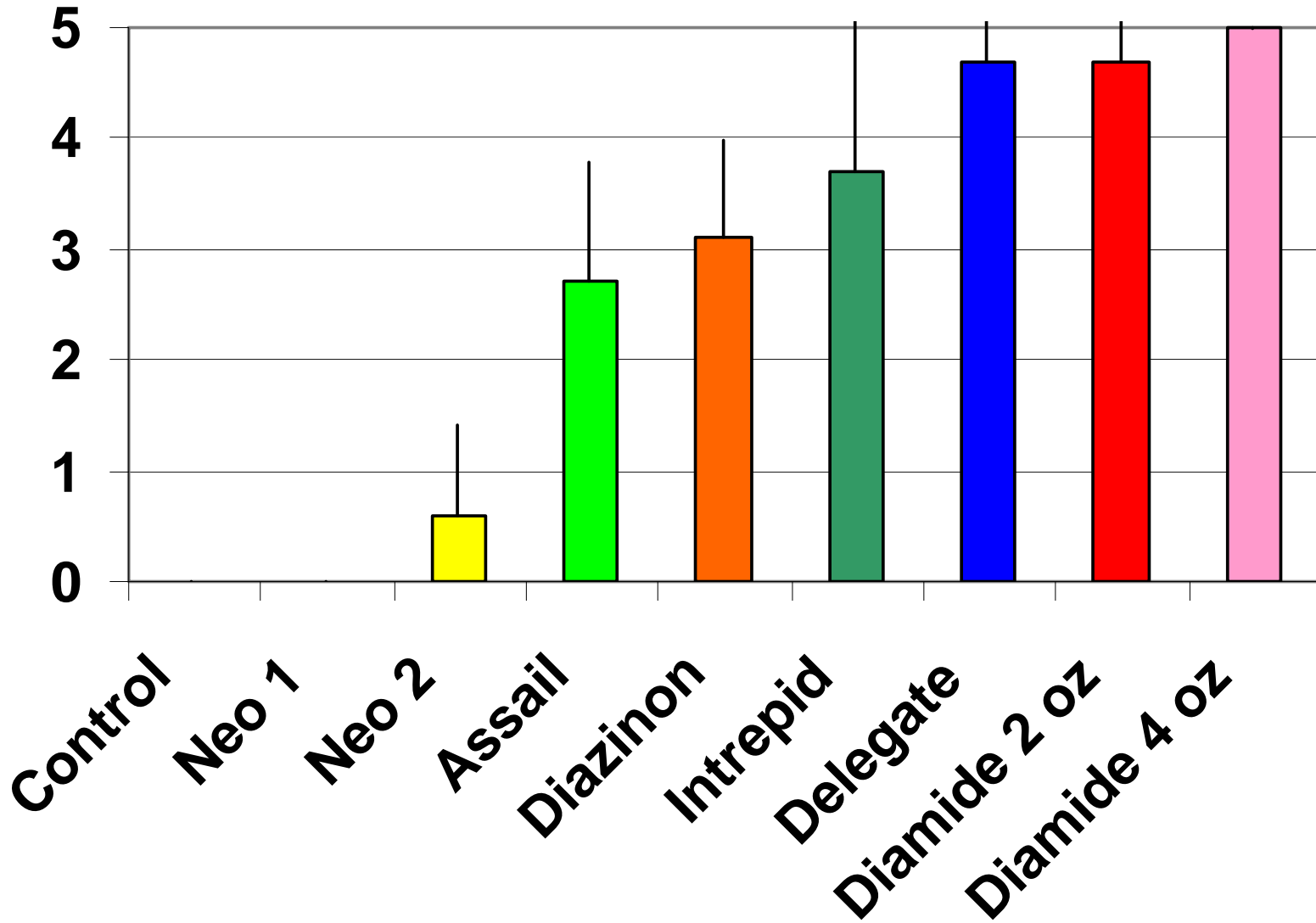
# Diamide 4 oz



# Plot assessment 8/21

Long residual

0=No control → 5= Best control  
Average plot rating





# Delegate 8/21



8/21



Diamide 4 oz. 8/21



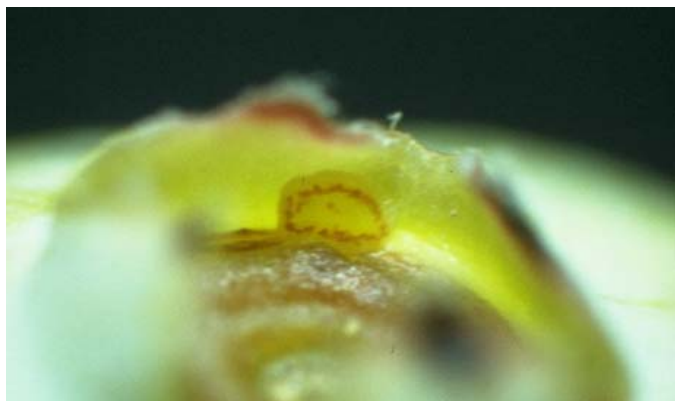
# Overview

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- diamide, Delegate, Assail active against CFW
- Intrepid, diamide, Delegate active against yellow-headed fireworm
  - With luck, same results seen with key pest, black-headed fireworm
- High residual >> diamide, Delegate, Intrepid



## 2. Cranberry fruitworm: management on Ben Lears and Stevens



# CFW on BL and ST beds

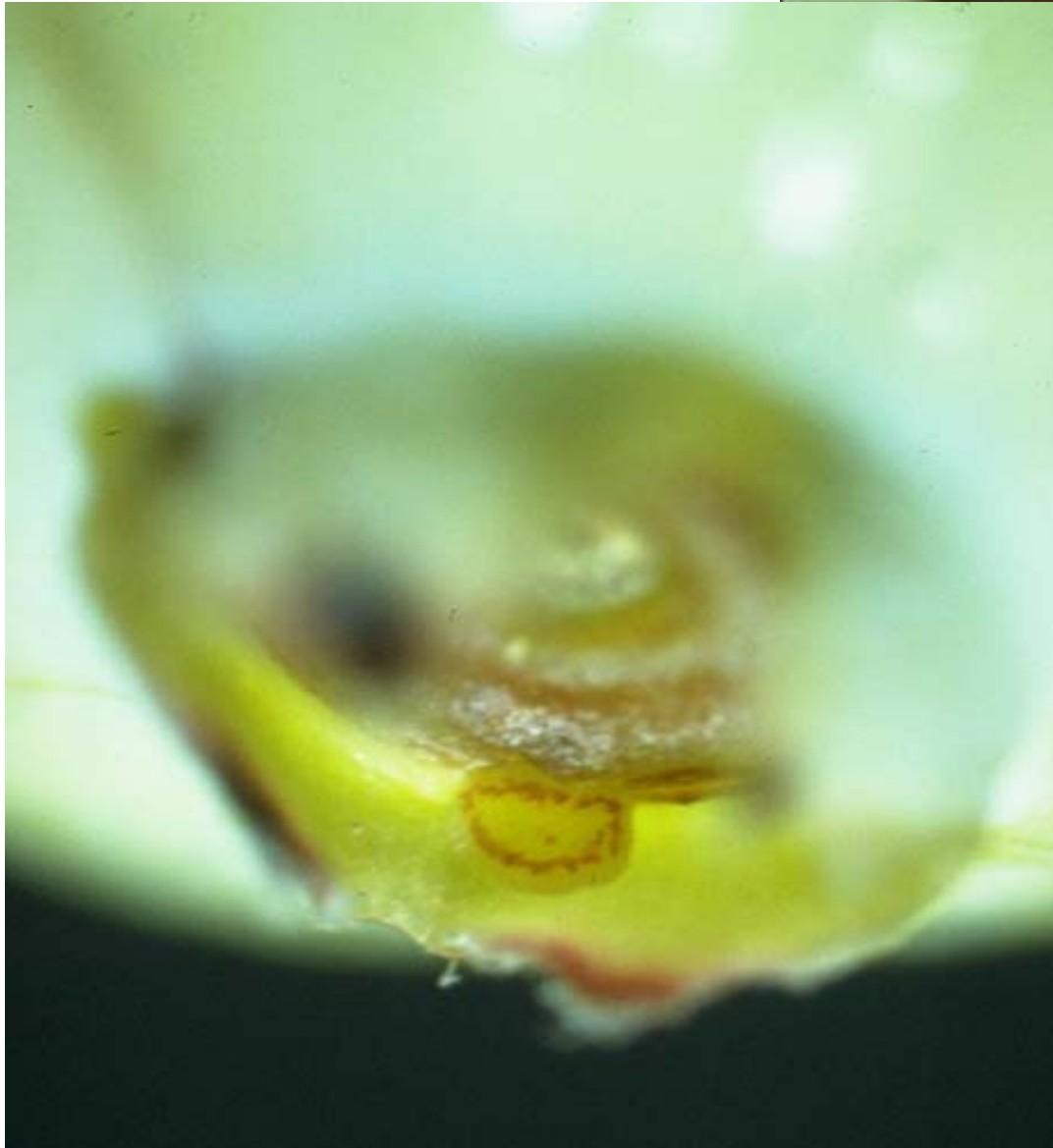
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- Chose 12 sites with beds of both cultivars
- Visited three times, start mid June
- For each bed, calculated
  - Egg infestation over early season
  - Levels of damage in August
  - % out of bloom
- Goal: improve management of CFW
  - spray timing
  - compound selection

# BL/ST site locations

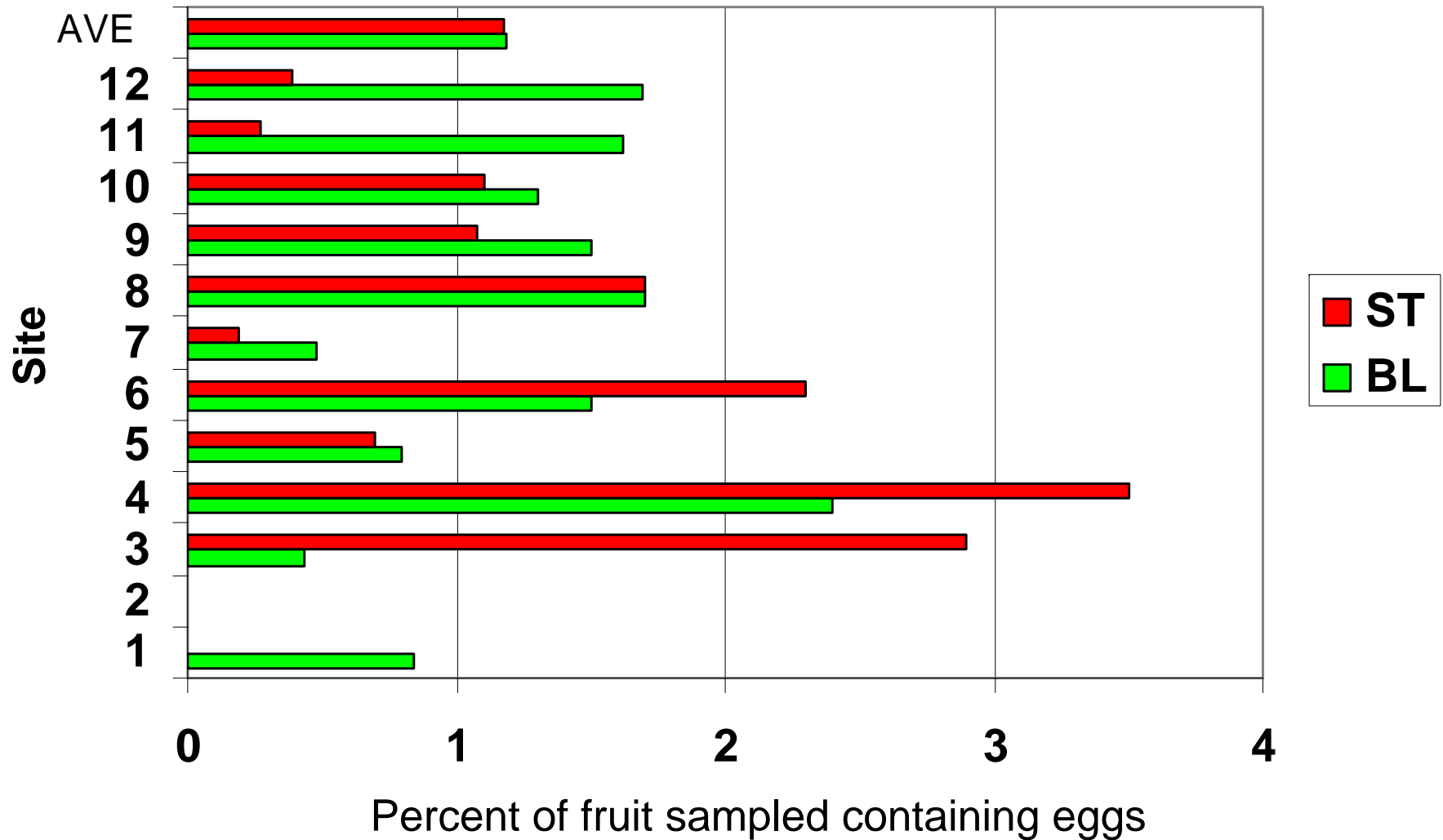
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|           |   |
|-----------|---|
| Carver    | 3 |
| Plymouth  | 3 |
| Wareham   | 3 |
| Plympton  | 2 |
| Rochester | 1 |





# Site comparisons egg infestation





**Cranberry fruitworm damage**

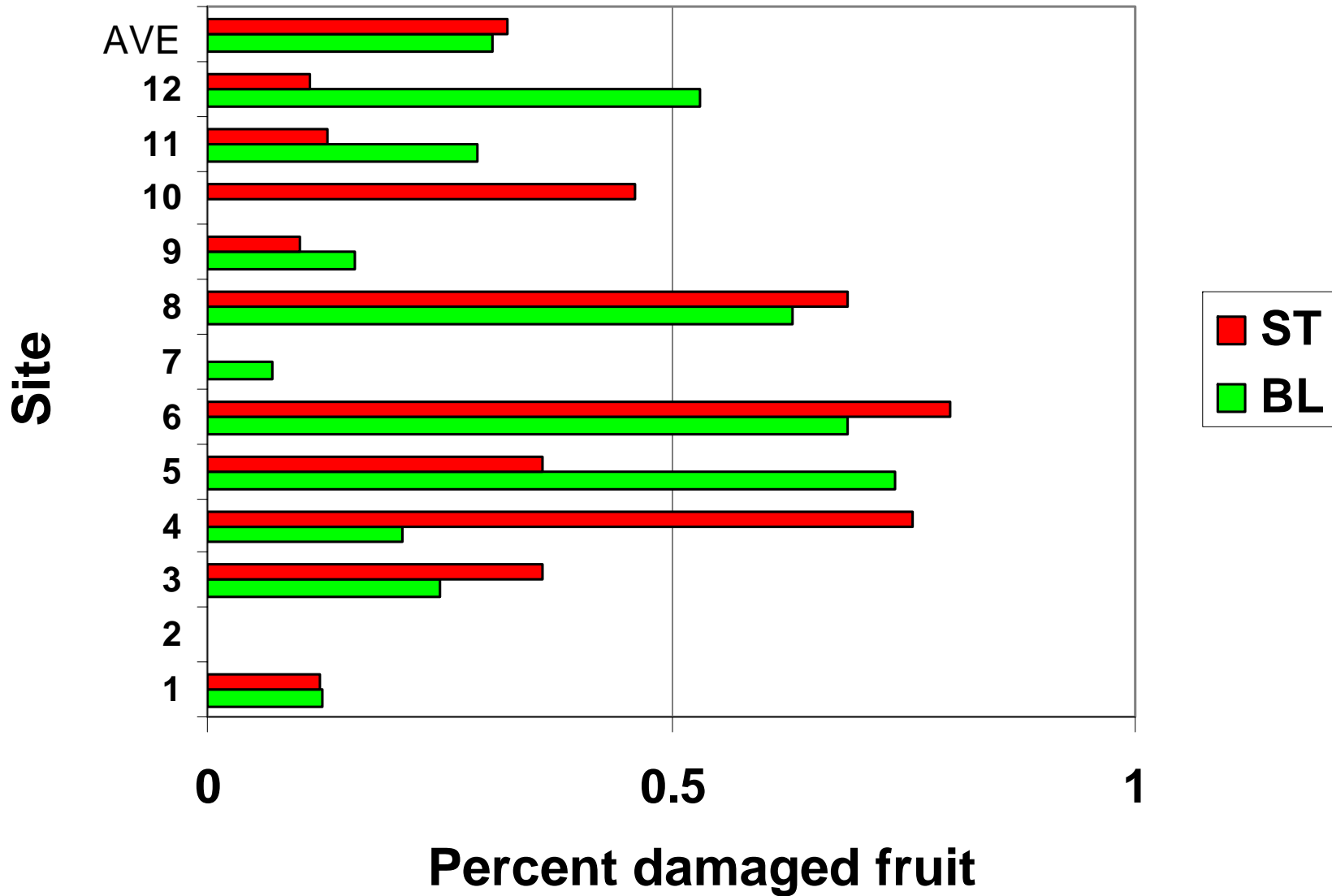


**0**

**CFW**

**SFW**

# % CFW fruit infestation in August

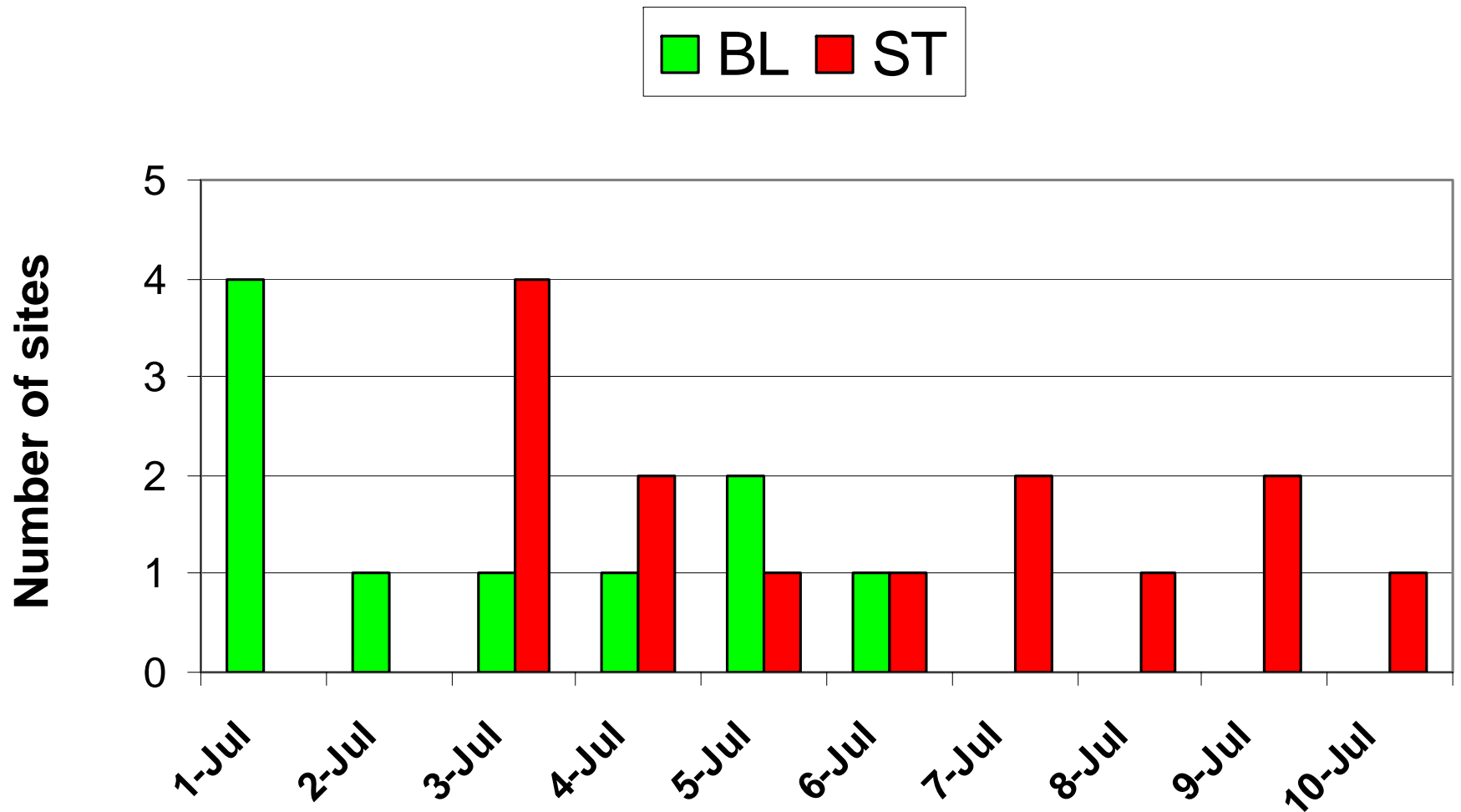


# Overview

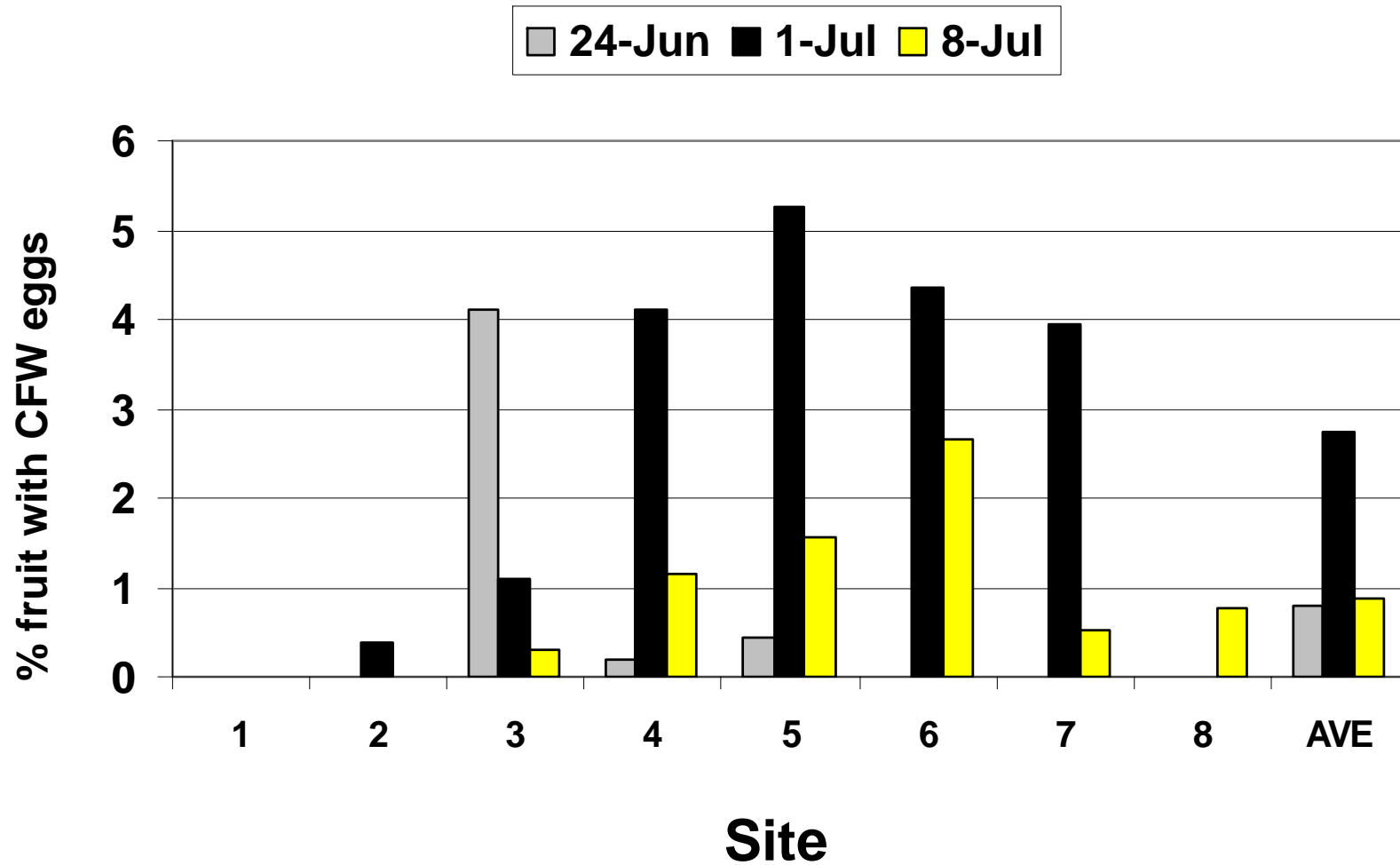
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- 9,335 fruit inspected
- Egg infestation very low in 2008, did not exceed 3.5% at any site
  - Some samples contained no eggs
- Damage estimates <1% on all beds in Aug
- No clear pattern of cultivar preference or infestation level
- If started with higher egg level, more damage noted in August

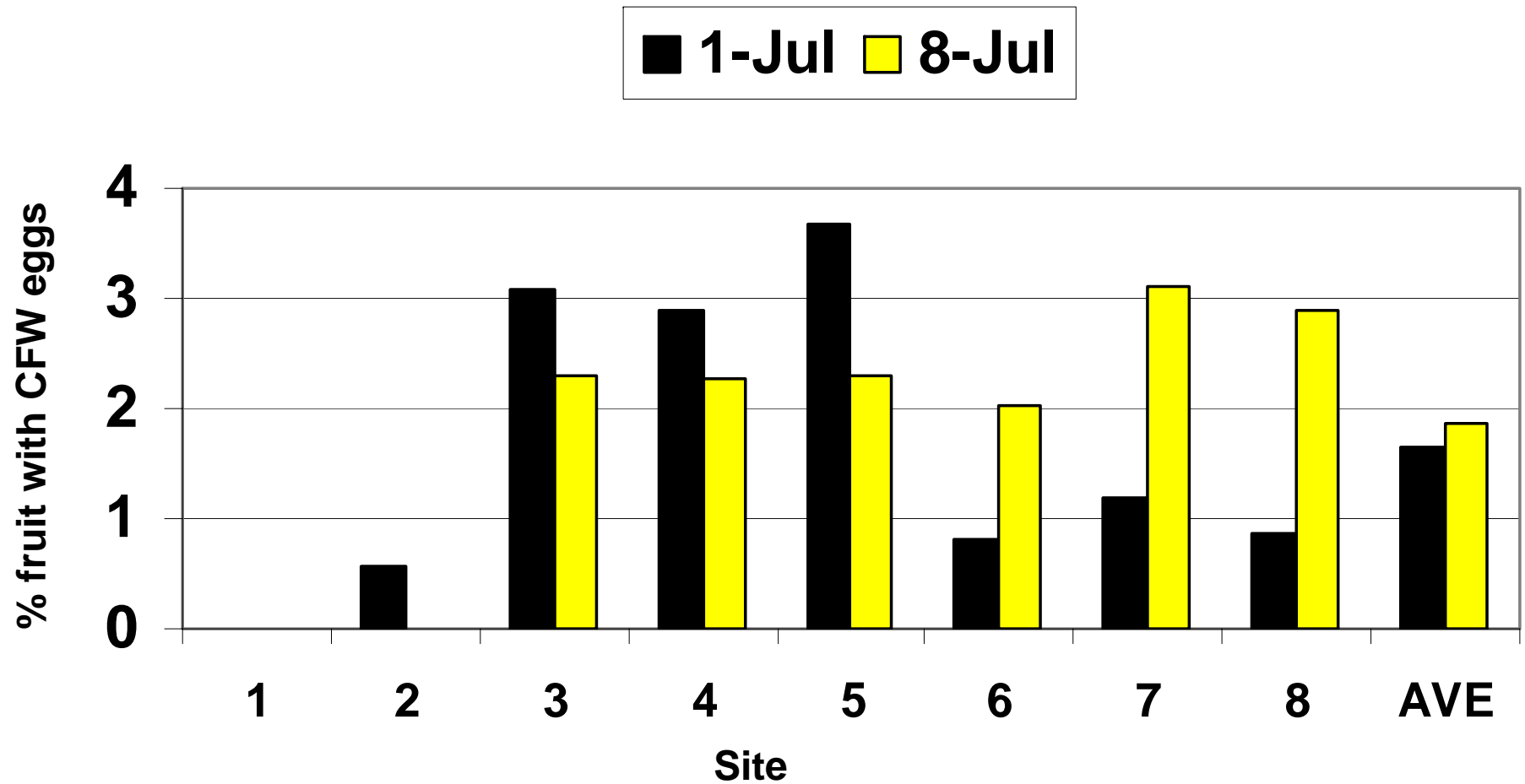
50% out of bloom  
number of sites by date  
BL ranged between July 1 and 6  
ST ranged between July 3 and 10



Ben Lear infestation pattern:  
peak occurred ca. 7/1 at most infested sites



Stevens infestation pattern:  
activity July 1 through July 8  
and before 50%OOB



# Conclusions

- Although OOB typically occurred later on ST than BL, egg laying not delayed on ST
- Subsequent years' data required:
  - Revisit spray timing recommendations based on percent out of bloom, particularly for Stevens



### 3. CCD status

