

Evaluation of a New Chemistries for Vegetable Insect Control

VC3 Meeting

9 Dec 2014 Davis, CA

- Eric T. Natwick
- Farm Advisor
- UC ANR Cooperative Extension
- Imperial County

**Cooperating Personnel: Dr. Martin Lopez, Staff Research Associate
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Mention of any pesticide in this presentation is not a recommendation.

New Aphid Control Chemistries

- **Exirel[®] and Verimark[®] (a.i. Cyantraniliprole)** DuPont
 - (MoA 28; ryanodine receptor modulators)
- **Sequoia[®] (a.i. sulfoxaflor)** under development by DowAgriSciences); **known as Closer[®]** outside of CA.
 - (MoA 4C; nAChR agonist / antagonist) (No C-DPR Label)
- **Sivanto[®] (a.i. flupyradifurone)**
 - (MoA 4D) a new butenolide class (No US-EPA or C-DPR labels)
- **Others (MoA UN unknown)**
 - **a.i. pyrifluquinazon** (under development) Nichino Americas (No US-EPA or C-DPR labels)

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New Worm Control Chemistries

- **Anthranilic Diamide Insecticide: (MoA 28)**
 - Synapse[®] (a.i. flubendiamide) Bayer CropScience
 - Coragen[®] SC (a.i. chlorantraniliprole) DuPont
 - Volium[®] Xpress, Voliam[®] Flexi & Durivo (mixtures that include chlorantraniliprole)
 - Verimark[®] (soil), Exirel[®] (foliar) (a.i. cyantraniliprole by DuPont and is under development by Syngenta)
 - a.i. cyclaniliprole (under development in the U.S. by ISK)
- **METI (MoA 21A; mitochondrial electron transport inhibitors)**
 - Torac[®] (a.i. tolfenpyrad) Nichino Americas (No C-DPR label)
- **Biopesticides (MoA unknown)**
 - Grandevo[®] (a.i. Chromobacterium subtsugae strain PRAA4-I and spent fermentation media) (Marrone Bio Innovations, Inc.)
 - Venerate[®] (a.i. Heat-killed Burkholderia spp, strain A396) (Marrone Bio Innovations, Inc.)
- **Others (MoA unknown)**
 - a.i. pyrifluquinazon (under development) Nichino Americas (No U.S. EPA or Cal-DPR label)

New Whitefly Control Insecticides

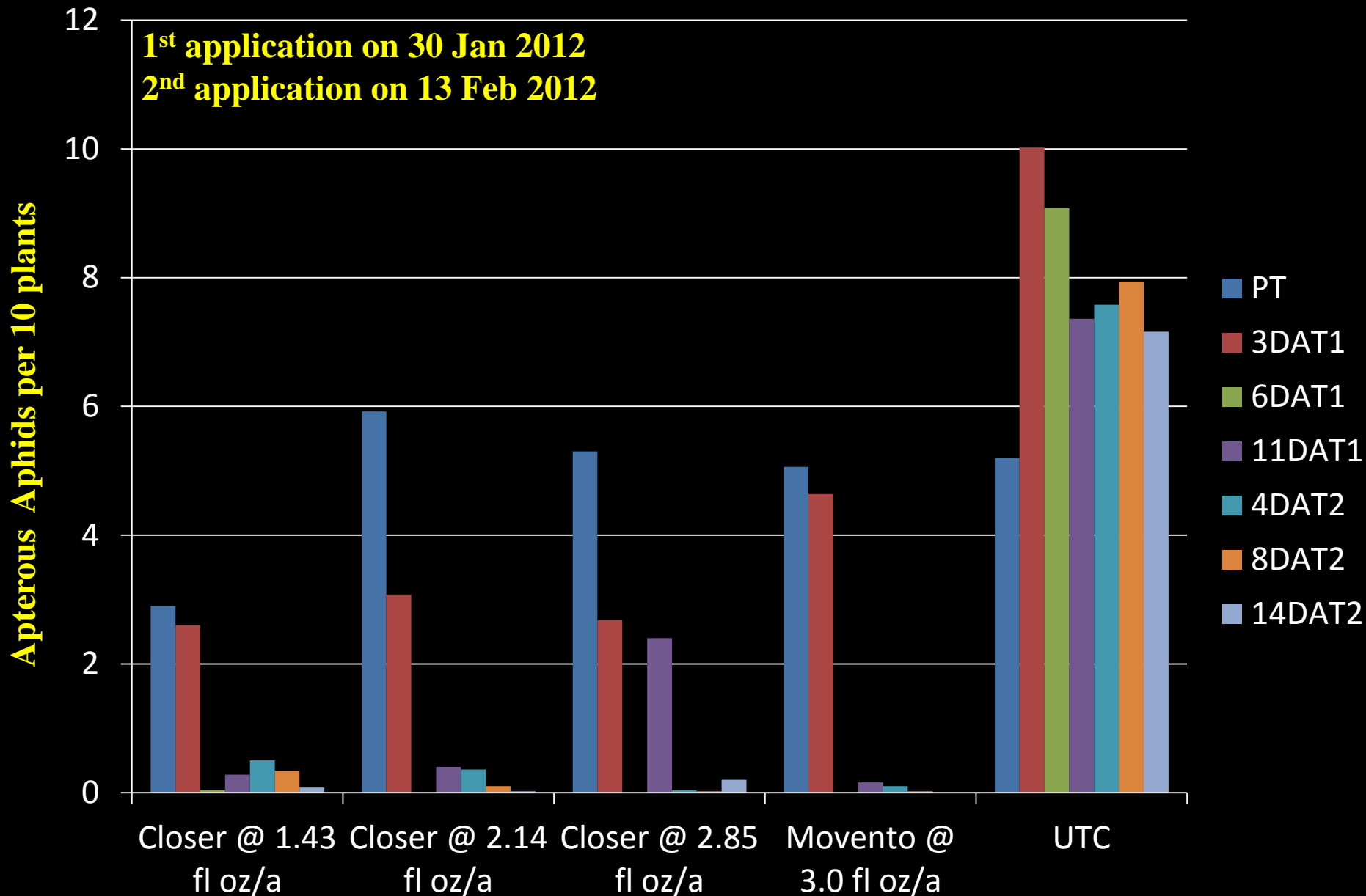
- **Anthranilic Diamide Insecticide: (MoA 28)**
 - Coragen SC (a.i. chlorantraniliprole) DuPont
 - Durivo, Volium Xpress and Voliam Flexi (mixtures that include chlorantraniliprole) (Syngenta)
 - Verimark & Exirel (a.i. cyantraniliprole) DuPont
 - a.i. cyclaniliprole (ISK) (No EPA label)
- **nAChR agonists (MoA 4)**
 - Sequoia (a.i. sulfoxaflor) (DowAgriSciences) (MoA 4C) (No C-DPR label)
 - Sivanto (a.i. flupyradifurone) (MoA 4D) a new butenolide class (No US-EPA or C-DPR labels)
- **METI (MoA 21A)**
 - Torac (a.i. tolfenpyrad) Nichino Americas (No C-DPR label)
- **Other: (MoA's unknown)**
 - a.i. pyrifluquinazon (under development Nichino Americas) (No US-EPA or C-DPR labels)

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Sequoia (Closer) Aphid Efficacy Trial on Cauliflower at UC Desert Research & Ext. Center 2012

- Insecticide were applied on 30 Jan and 13 Feb 2012.
- Foliar sprays applied using a Lee Spider Spray Trac tractor with a spray boom that included three TJ-60 11003VS nozzles per bed, covering four beds (twelve nozzles on the boom) applying 50.6 gpa at 25 psi.
- Alate aphids and apterous aphids were counted on ten random plants in each plot on each sampling date
- There were two aphid species present; initially only GPA, *Myzus persicae* and later CA, *Brevicoryne brassicae* colonies were detected in low numbers.

Aphicide Efficacy Trial on Cauliflower at UC Desert Res & Ext Center 2012



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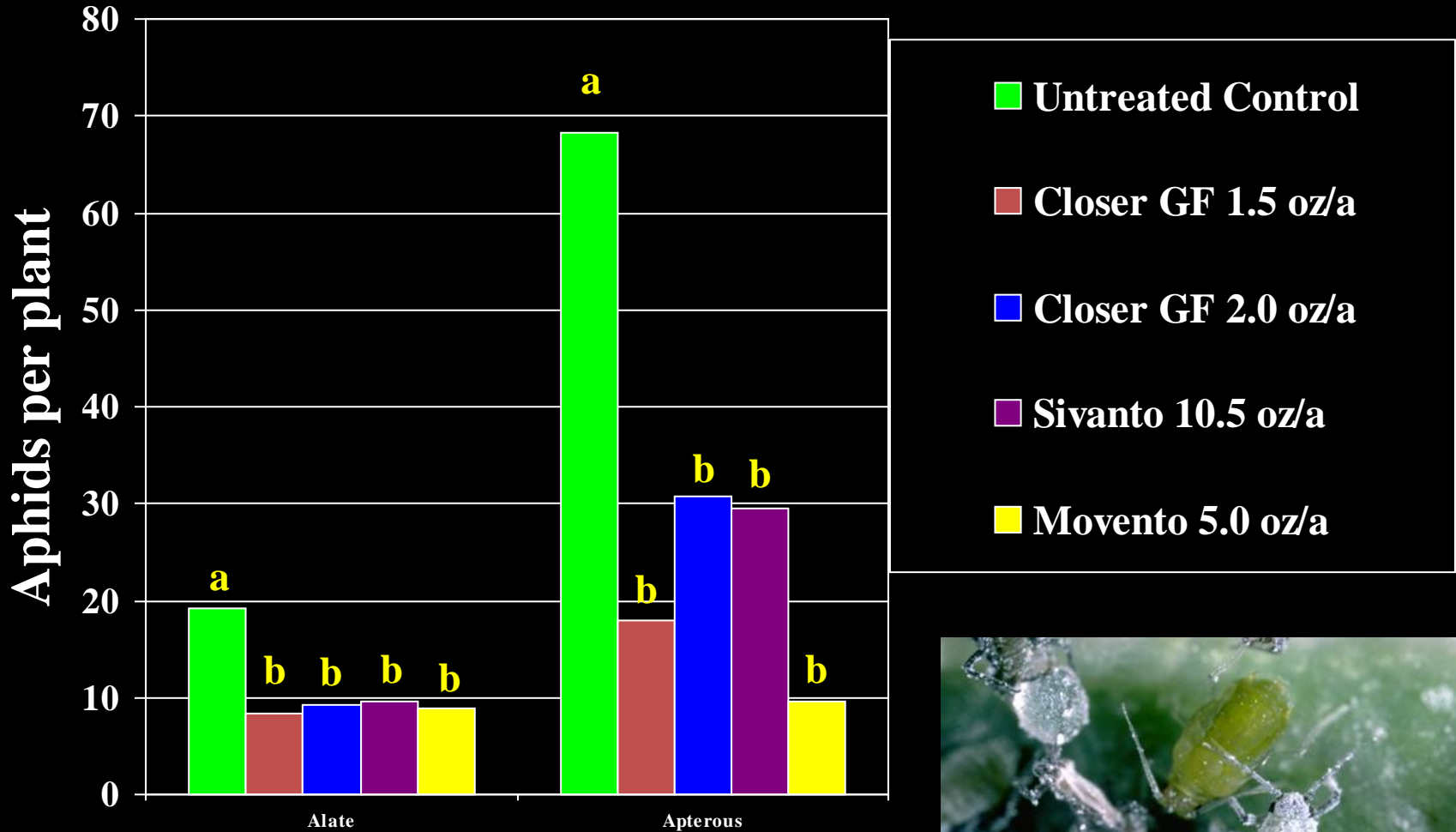
Aphicide Efficacy Trial on Cauliflower at UC DREC 2012

Treatment	oz/acre	Total heads	Aphid culls	Market heads	% Market heads	Aphid Post Treatment Avg.
Sequoia SC	1.43	23.20 a	0.60 b	22.60 a	97.06 b	0.64 b
Sequoia SC	2.14	22.60 a	0.20 b	22.40 a	99.09 b	0.66 b
Sequoia SC	2.85	24.40 a	0.40 b	24.00 a	98.69 b	0.53 b
Movento	5.00	22.20 a	0.60 b	21.60 a	97.00 b	0.82 b
Check	-----	23.20 a	2.80 a	20.40 a	88.35 a	8.19 a

Means within columns followed by the same letter are not significantly different; LSD, $P > 0.05$.

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Insecticide Efficacy Evaluation for Post Treatment Averages of Green Peach and Cabbage Aphids on Cauliflower at Holtville, CA in 2013

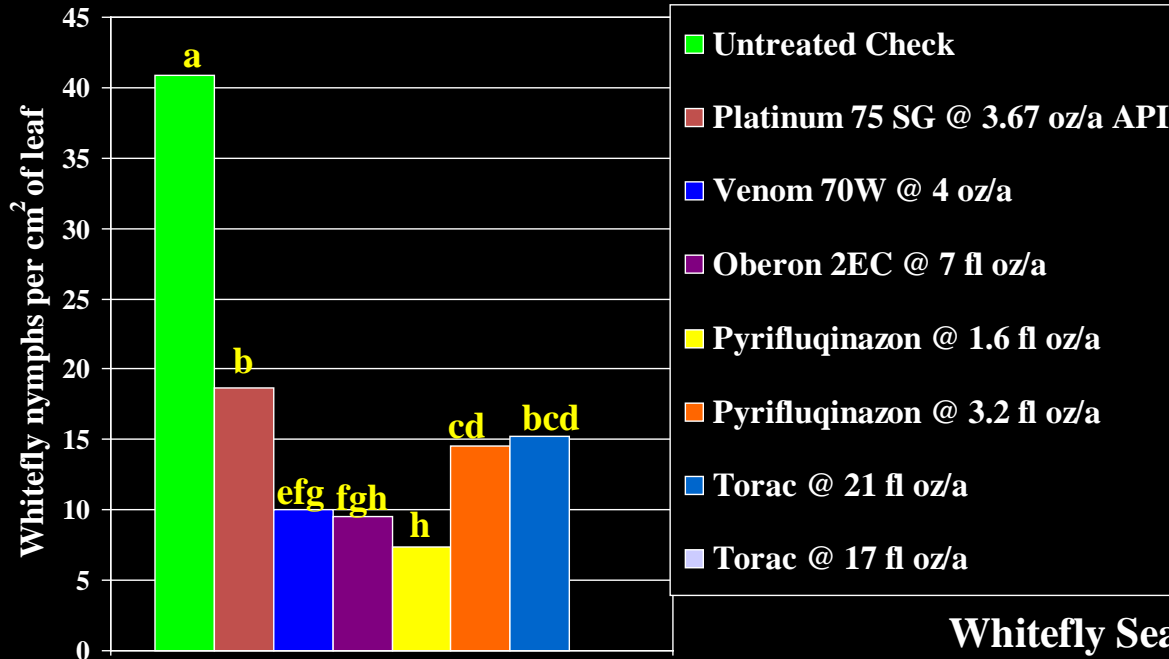


Columns without the same letters are significantly different; LSD, $P < 0.05$

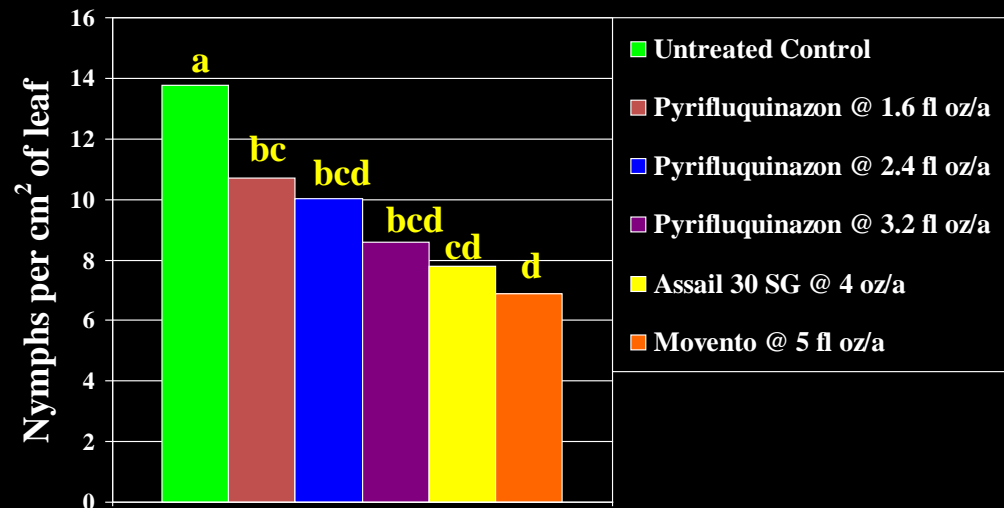
**Sequoia does not have a C-DPR Label and
Sivanto does not have a US EPA or Cal DPR label**



Whitefly Seasonal averages on Canteloupe at Holtville, CA in 2009



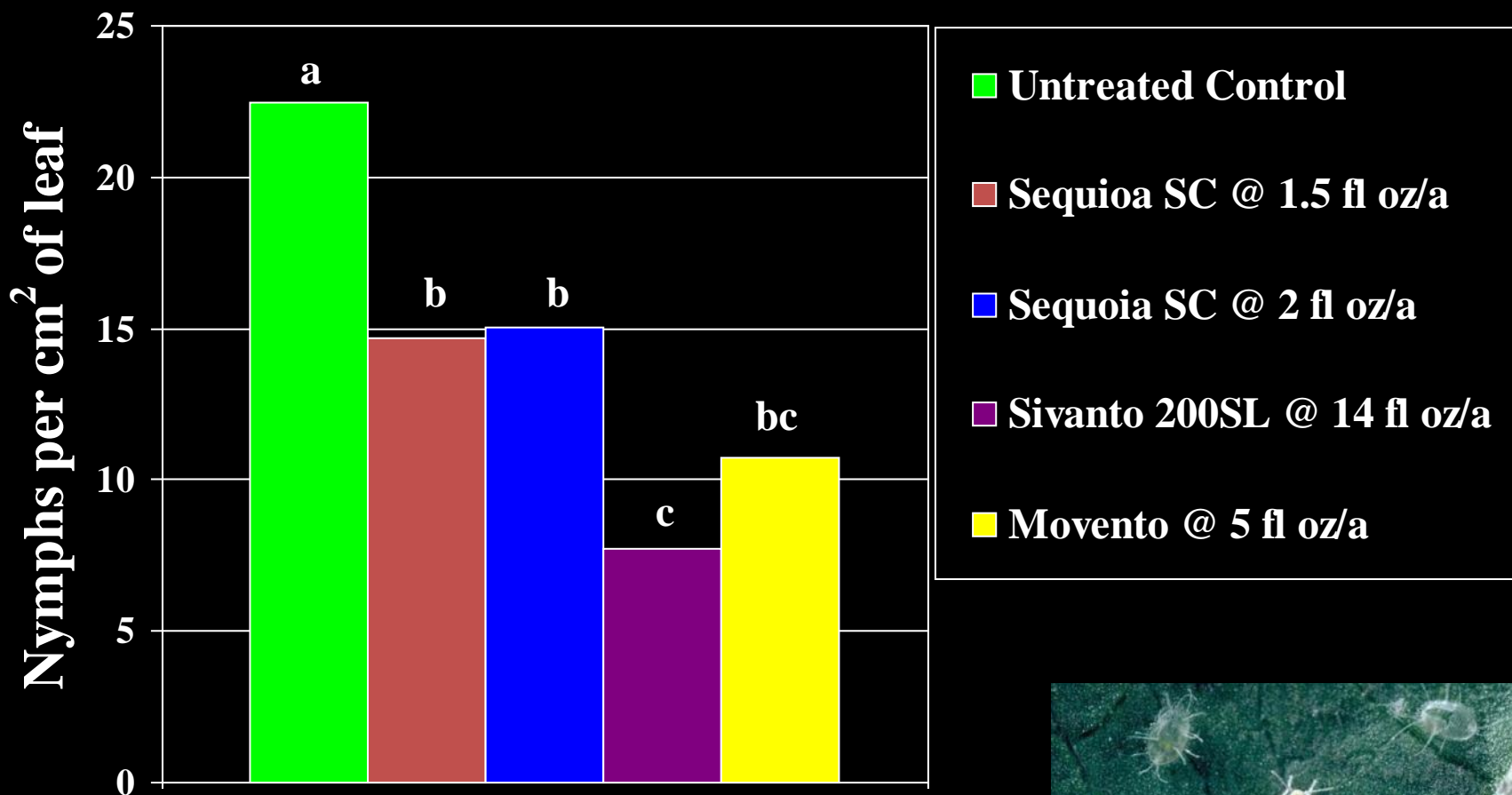
Whitefly Seasonal Averages In Broccoli At Holtville, CA in 2010



Within each figure, columns without the same letters are significantly different; LSD, $P < 0.05$

Torac does not have a C-DPR label and Pyrifluquinazon does not have a US EPA or Cal DPR label for vegetable crops.

Whitefly Seasonal Averages In Broccoli At Holtville, CA in 2012



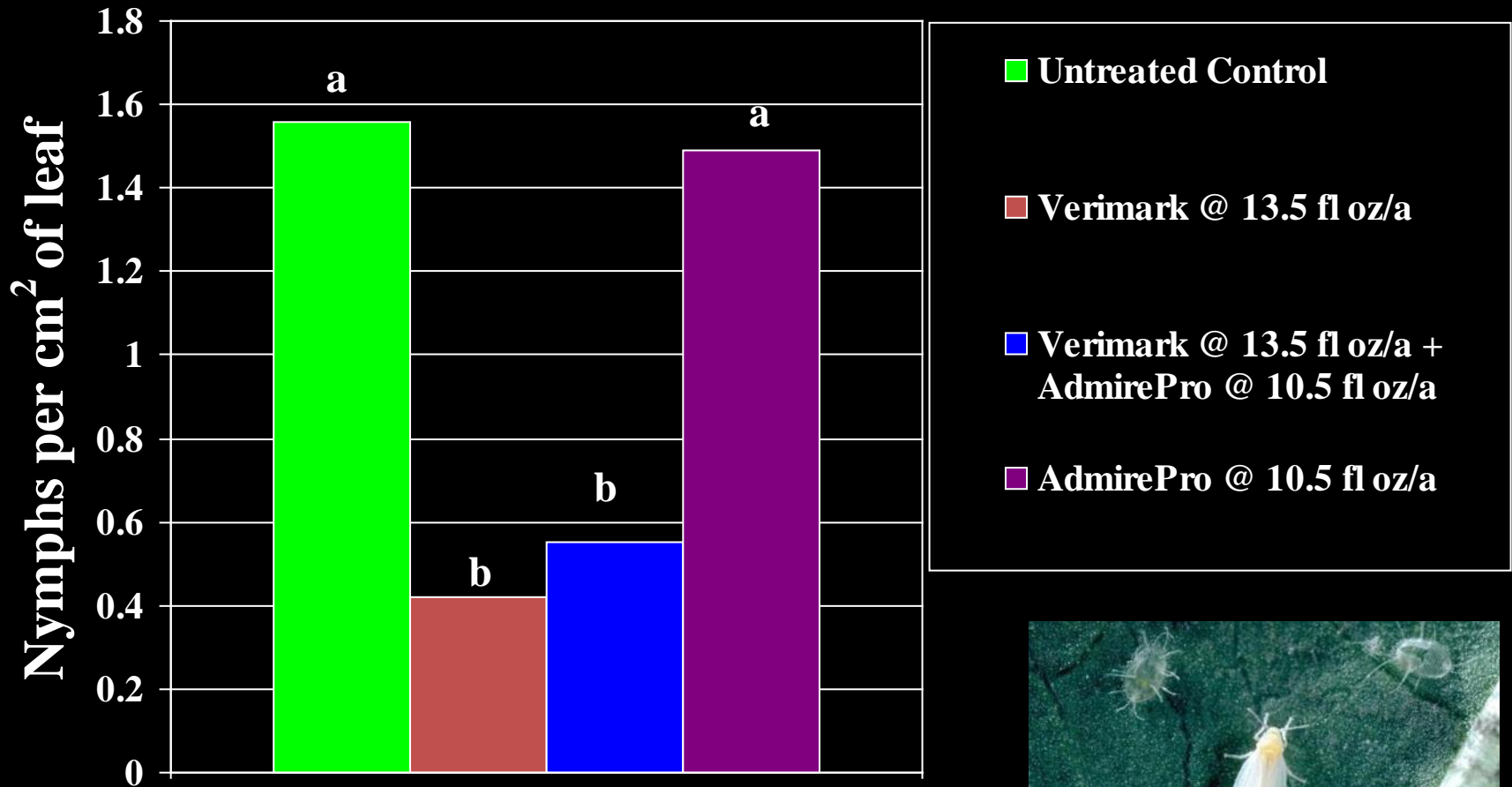
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**Sequoia does not have a C-DPR label and
Sivanto does not have a US EPA or Cal DPR label.**

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Soil injections at planting for whitefly control in lettuce at Holtville, CA in 2012

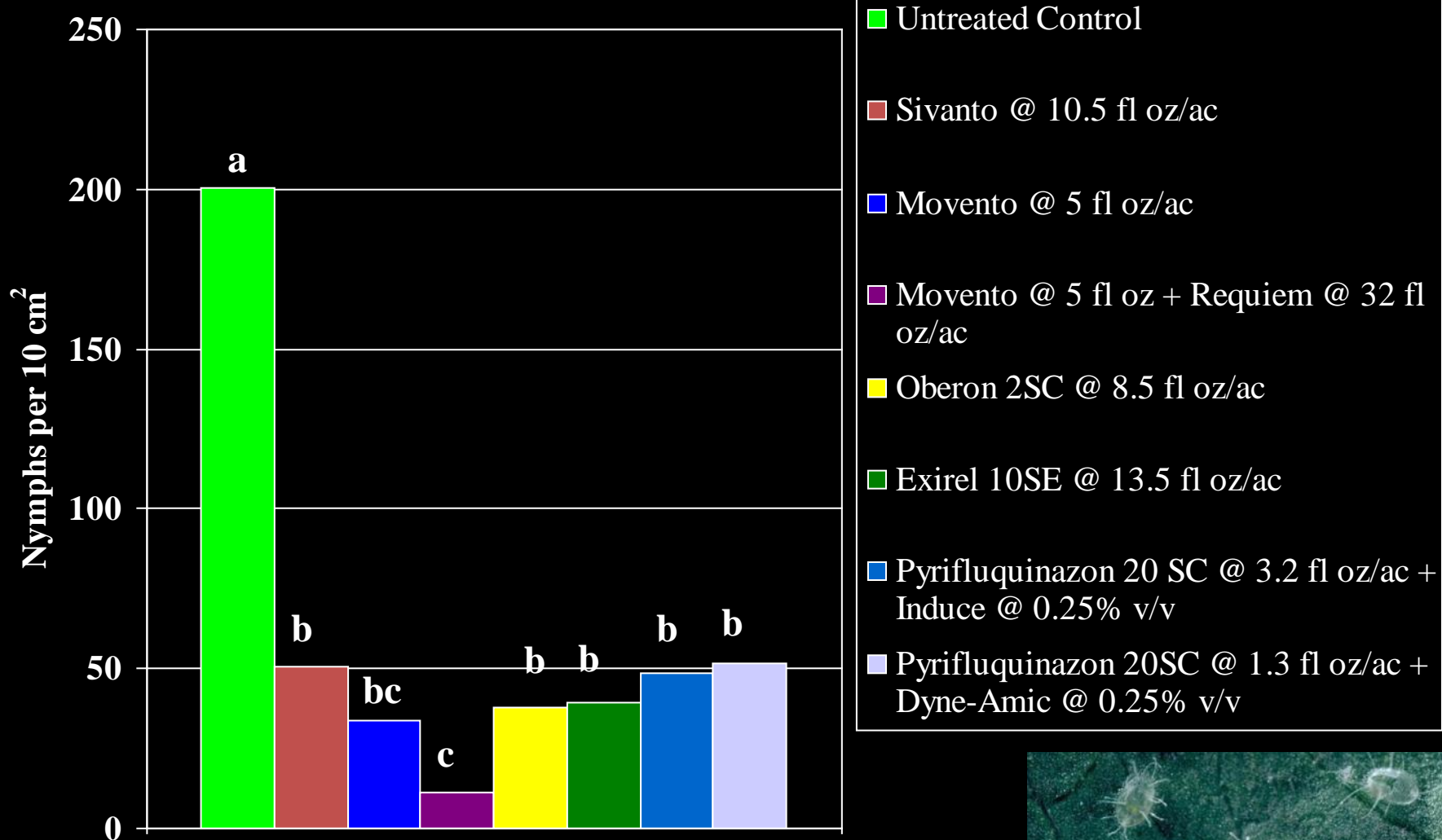


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Whitefly Seasonal Averages In Broccoli At Holtville, CA in 2014



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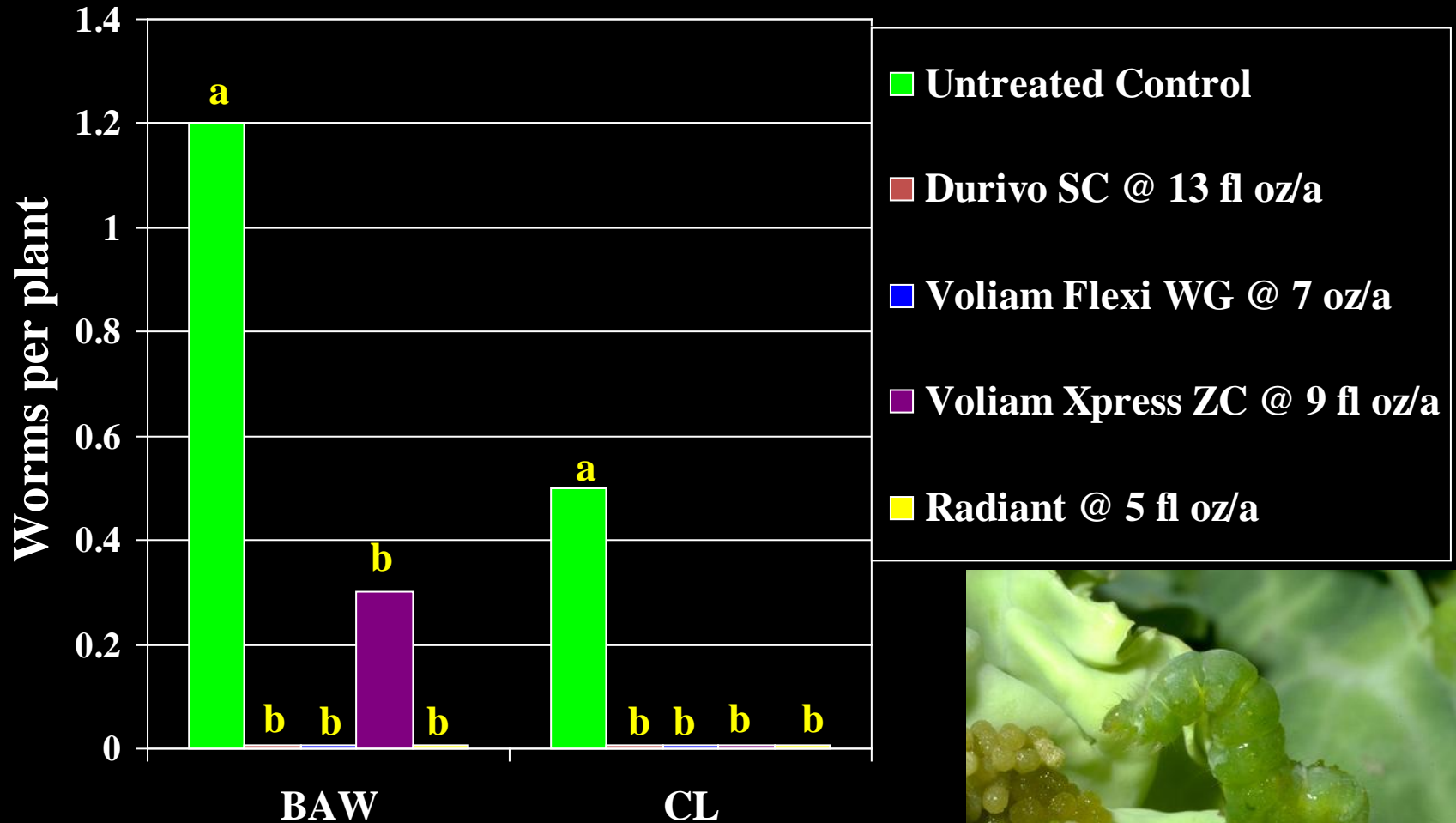
Pyrifluquinazon does not have a C-DPR label and Sivanto does not have a US EPA or Cal DPR label.

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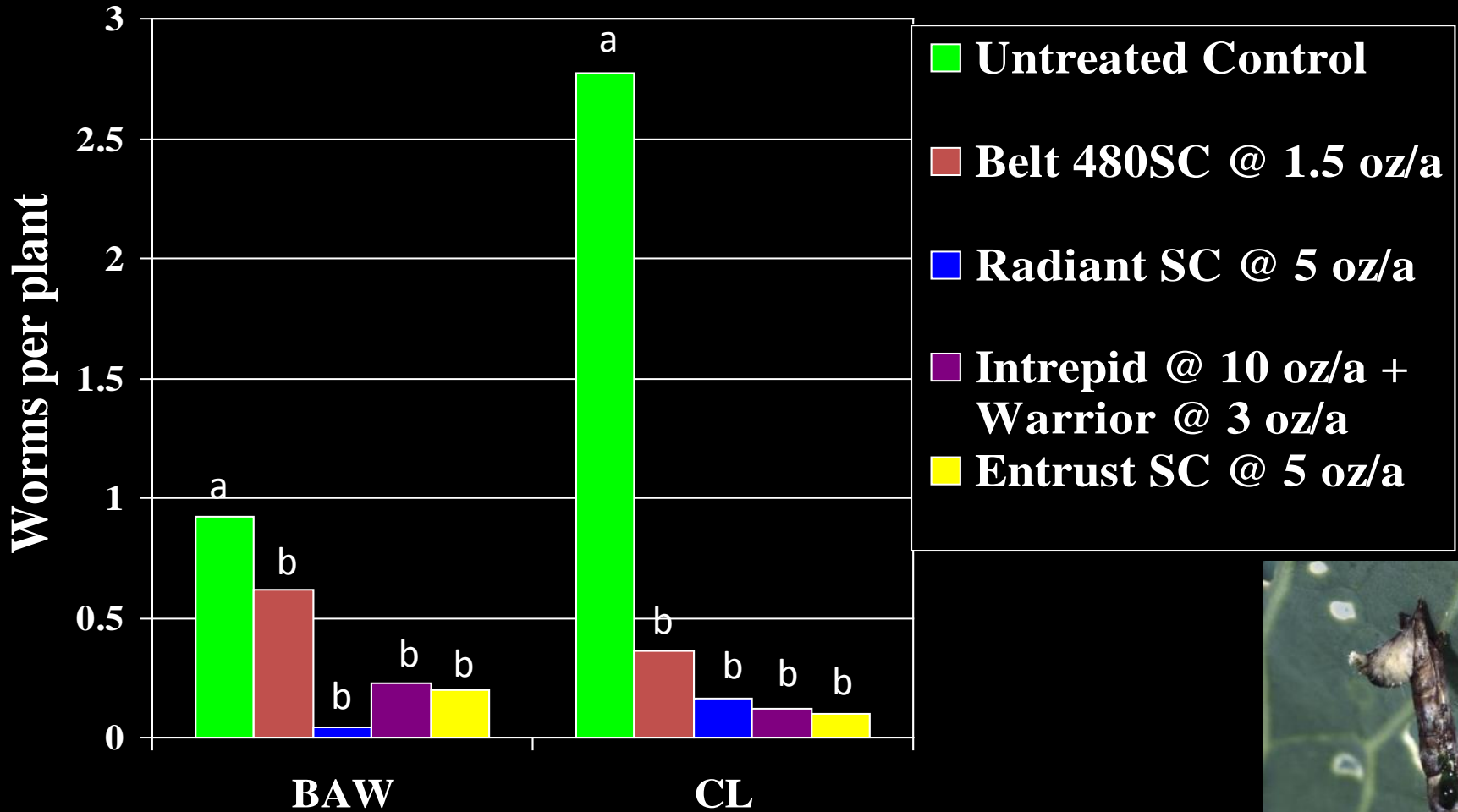
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Insecticide Efficacy Against Worm Pests on Lettuce at Holtville, CA in 2010



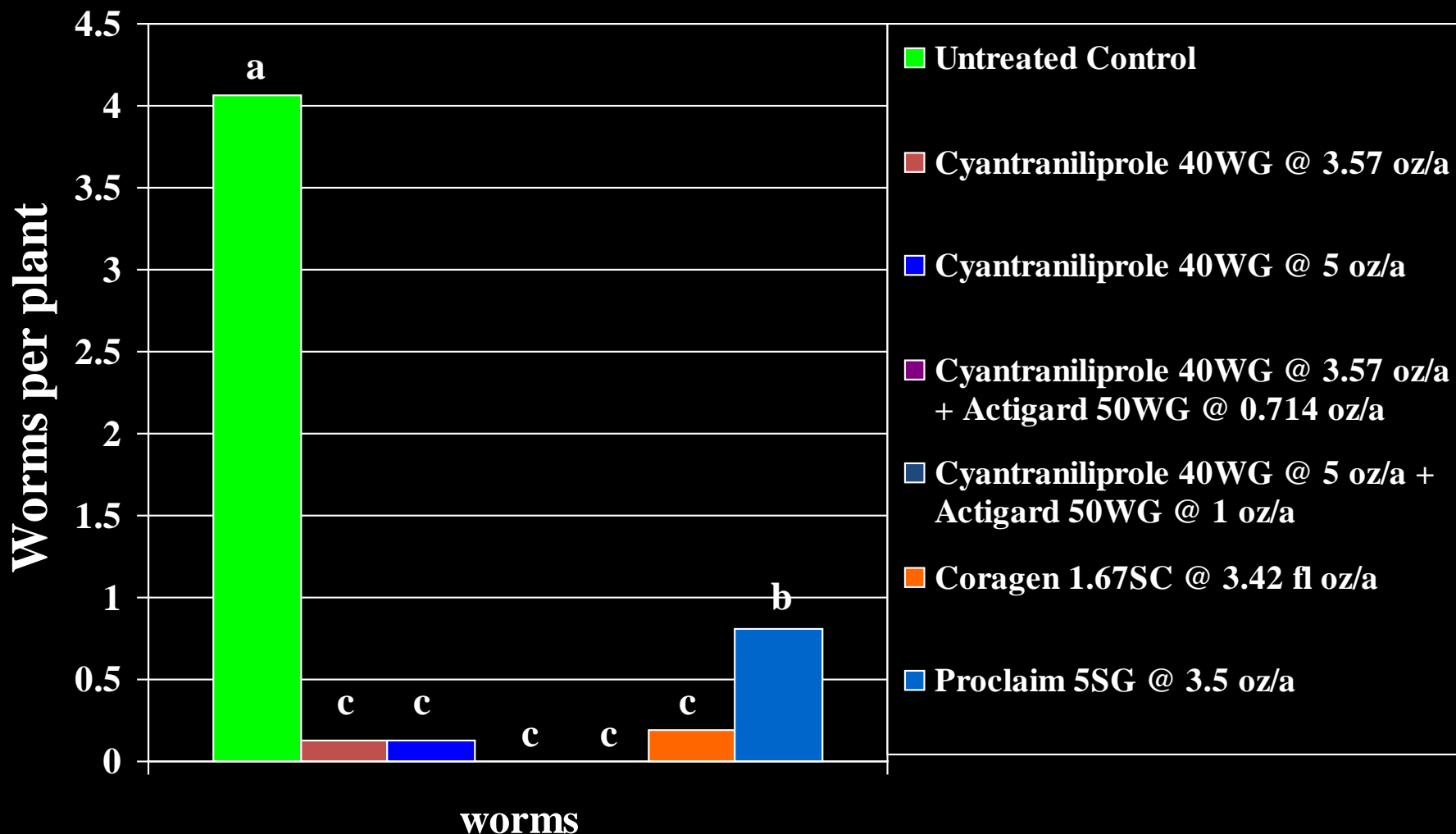
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Insecticide Efficacy Against Worm Pests on Lettuce at Holtville, CA in 2012



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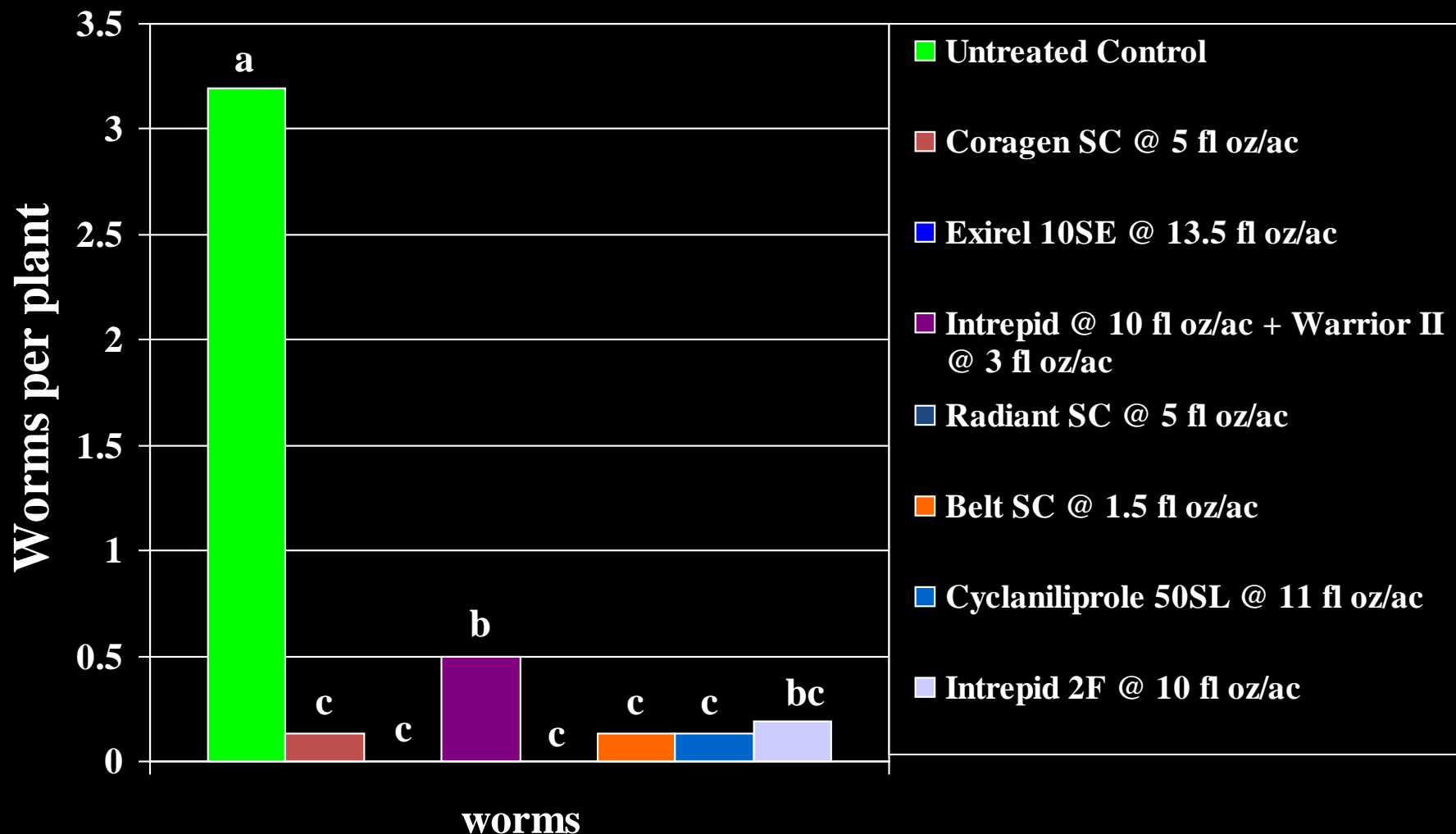
Insecticide Efficacy Against Worm Pests on Lettuce at Holtville, CA in 2013



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Insecticide Efficacy Against Worm Pests on Lettuce at Holtville, CA in 2014



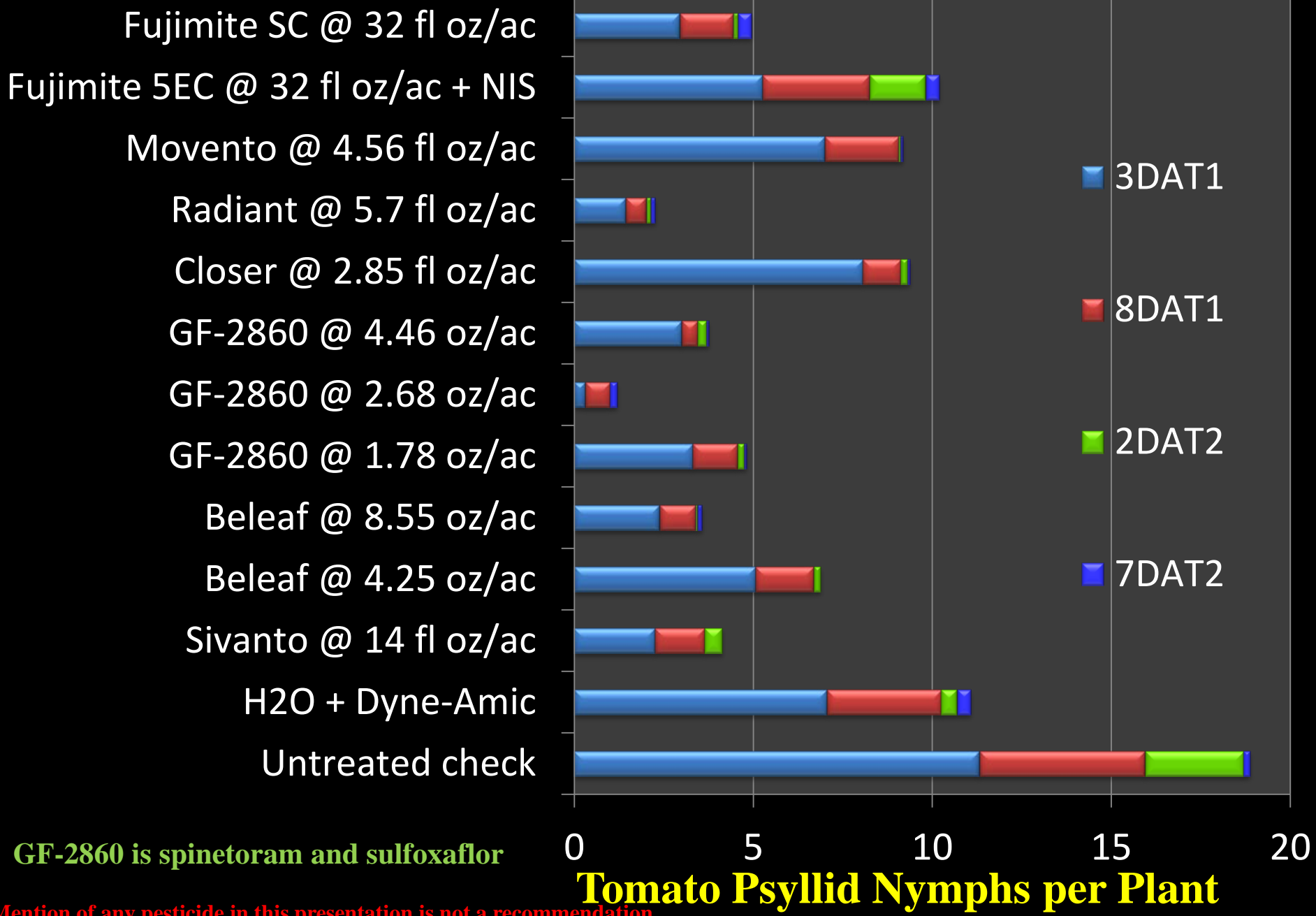
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Tomato Psyllid Insecticide Efficacy Trial on Greenhouse Peppers, 2012.

- Hand-held, CO₂ propelled, backpack sprayer with 3 Conejet TXVS-4 nozzles on a 17 inch boom with one nozzle on each end angled in at 45° angle toward the plants and one nozzle pointed downward directly over the plant row delivering 27.62 gpa at 30 psi.

Tomato Psyllid Insecticide Efficacy Trial on GH Peppers, 2012.

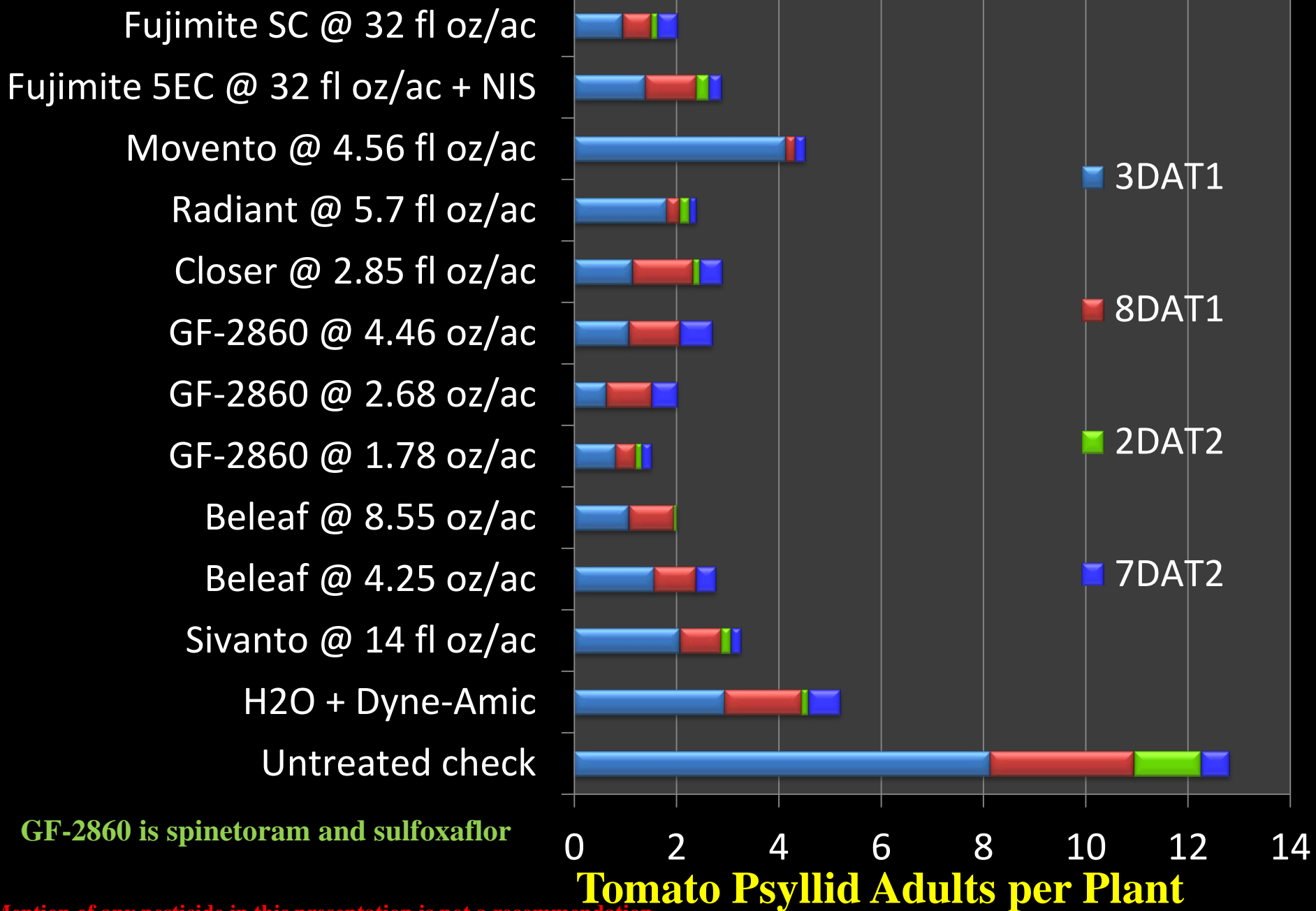


GF-2860 is spinetoram and sulfoxaflor

Tomato Psyllid Nymphs per Plant

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Tomato Psyllid Insecticide Efficacy Trial on GH Peppers, 2012.



GF-2860 is spinetoram and sulfoxaflor

Tomato Psyllid Adults per Plant

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Exirel and Verimark (a.i. cyantraniliprole)

- Exirel & Verimark are diamide insecticides **IRAC Group 28** ryanodine receptor modulators nerve and muscle action.
- What are the benefits?
 - My experience with Exirel & Verimark :
 - I don't have personal experience with cyantraniliprole as an aphicide.
 - I have found cyantraniliprole to be more active against sweetpotato whitefly biotype B than other diamides.
 - Cyantraniliprole is very efficacious for control of sweetpotato whitefly biotype B; as efficacious as most industry standards
 - Exirel & Verimark will be useful for IRM.
 - Diamides, including cyantraniliprole, are highly efficacious for control of lepidopterous worm pests.
 - Diamides are safer for beneficial arthropods than older broad spectrum chemistries; e.g., organophosphates, carbamates and pyrethroids.

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Sequoia (a.i. sulfoxaflor)

- Sequoia is a **IRAC Group 3C** nicotinic acetylcholine receptor (nAChR) agonist nerve poison.
- What are the benefits?
 - My experience with Sequoia (Closer) a.i. sulfoxaflor:
 - Sequoia is a good aphicide with efficacy comparable to an industry standard, Movento.
 - Sequoia is useful in IRM, preventing aphid insecticide resistance.
 - I found Sequoia to be slow acting against tomato psyllid, but may be an efficacious alternative that should help with IRM
 - Sequoia may not be as efficacious as some industry standards for control of sweetpotato whitefly biotype B but it is useful for IRM.
 - Safer for beneficial arthropods than older broad spectrum chemistries; e.g., organophosphates, carbamates and pyrethroids.

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Sivanto (a. i. flupyradifurone)

- Sivanto 200SL is a butenolide; **IRAC Group 3D** a nAChR agonist nerve poison.
- What are the benefits?
 - My experience with Sivanto 200SL :
 - Sivanto is a good aphicide with efficacy comparable to an industry standard, Movento.
 - Sivanto is another aphicide that will be useful for IRM.
 - I found Sivanto to be slow acting against tomato psyllid, but may be an efficacious alternative that should help with IRM
 - Sivanto is as efficacious as some industry standards for control of sweetpotato whitefly biotype B and will be useful for IRM.
 - Safer for beneficial arthropods than older broad spectrum chemistries; e.g., organophosphates, carbamates and pyrethroids.

(a. i. pyrifluquinazon)

- The mode of activity of a.i. pyrifluquinazon remains unknown; **IRAC Group UN** a nAChR agonist nerve poison.
- What are the benefits?
 - My experience with a.i. pyrifluquinazon:
 - I don't have direct experience with pyrifluquinazon for aphid control, but I've seen where it was less efficacious than an industry standard, Movento.
 - Pyrifluquinazon is as efficacious as some other industry standards for control of sweetpotato whitefly biotype B and will be useful for IRM.
 - Pyrifluquinazon looks promising for reducing the transmission for certain whitefly transmitted plant viruses; e.g., CYSDV.
 - Safer for beneficial arthropods than older broad spectrum chemistries; e.g., organophosphates, carbamates and pyrethroids.

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