



2011 Salinas Entomology Meeting

Insecticides for Use on Cool Season Vegetables

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New & Old Insecticides

- Several “Reduced Risk” insecticides are under development or were recently registered for vegetable insect pest control. But, do they work?
- Are “Older Insecticides” still efficacious?
- Are new insecticides better?

“Newer” Worm Control Chemistries

- **Anthranilic Diamide Insecticide: (MoA 28)**
 - Synapse[®] (a.i. flubendiamide) Bayer CropScience
 - Coragen[®] SC (a.i. chlorantraniliprole) DuPont
 - Verimark (soil), Exirel (foliar) (a.i. cyantraniliprole is under development by DuPont and Syngenta) **No US EPA or Cal DPR label**
- **Spinosyns: (MoA 5)**
 - Success[®] & Entrust[®] (a.i. spinosad) Dow AgroSciences
 - Radiant[®] SC (a.i. spinetoram) Dow AgroSciences
- **IGR's:**
 - Intrepid[®] (a.i. methoxfenozide) (Dow AgroSciences) (MoA 18)
 - Rimon[®] (a.i. novaluron) (Chemtura USA Corp.) (MoA 15)
- **Others (MoA unknown)**
 - a.i. pyrifluquinazon (under development) Nichino Americas
 - Torac (a.i. tolfenpyrad; under development by Nichino Americas)
No US EPA or Cal DPR label

“Older” Worm Control Chemistries

■ **Avermectins & *Bt* Products:**

- Proclaim[®] (a.i. emamectin benzoate) Syngenta (MoA 6)
- *Bacillus thuringiensis ssp. Aizawai* (various products) (MoA 11B1)
- *Bt ssp. Kurstaki* (various products) (MoA 11B2)

■ **Pyrethroids: (MoA 3) (many others not listed)**

- (a.i. permethrin) Amvac’s Ambush[®] or FMC’s Pounce[®]
- Brigade[®] (a.i. bifenthrin) FMC
- Mustang[®] (a.i. zeta-cypermethrin) FMC

■ **Organophosphates: (MoA 1B)**

- Dibrom[®] (a.i. Naled) Amvac
- Lorsban[®] (a.i. chlorpyrifos) Dow AgriSciences

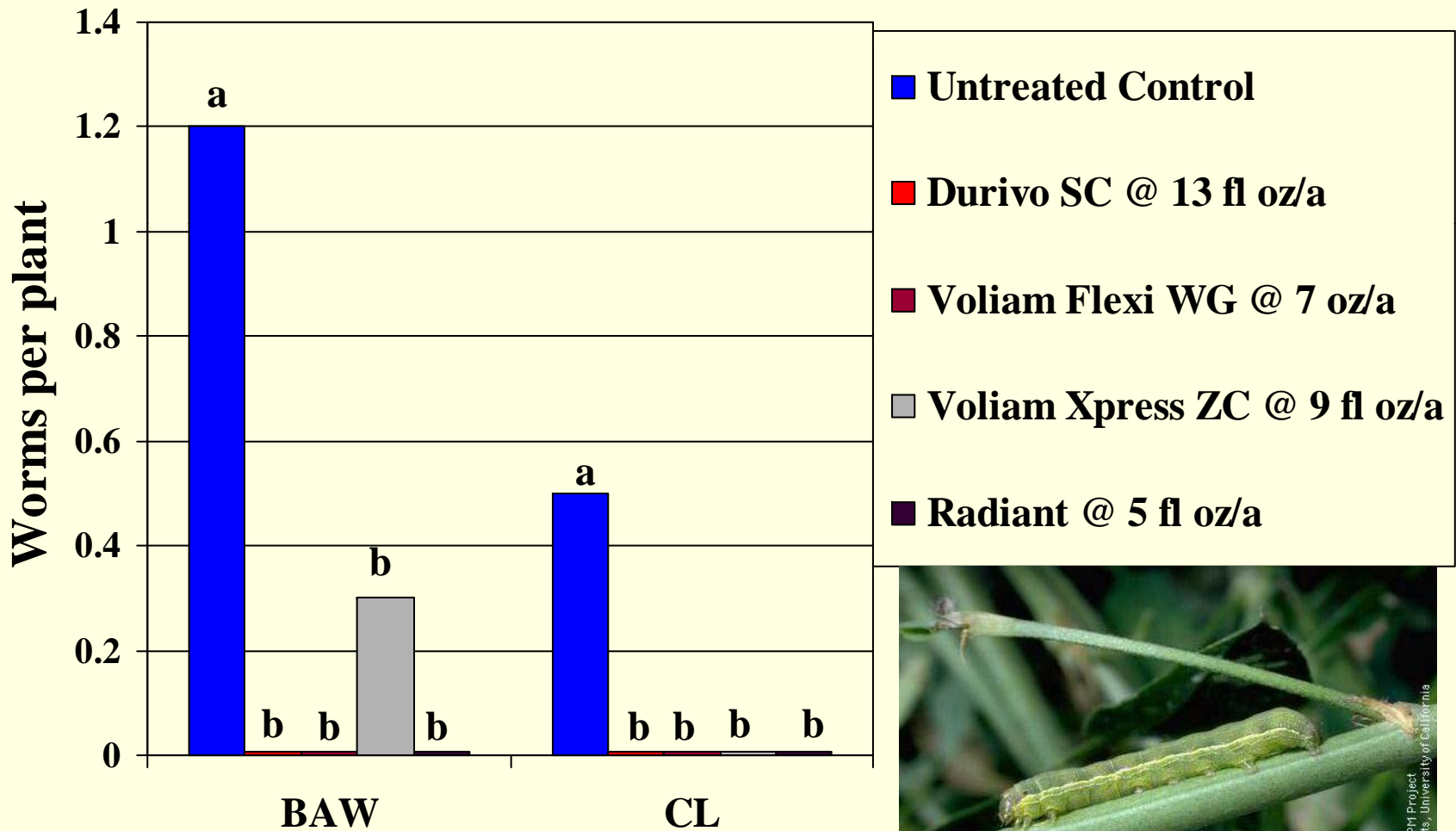
■ **Carbamates: (MoA A1)**

- Lannate[®] (a.i. methomyl) DuPont
- Larvin[®] (a.i. thiodicarb) Bayer CropScience

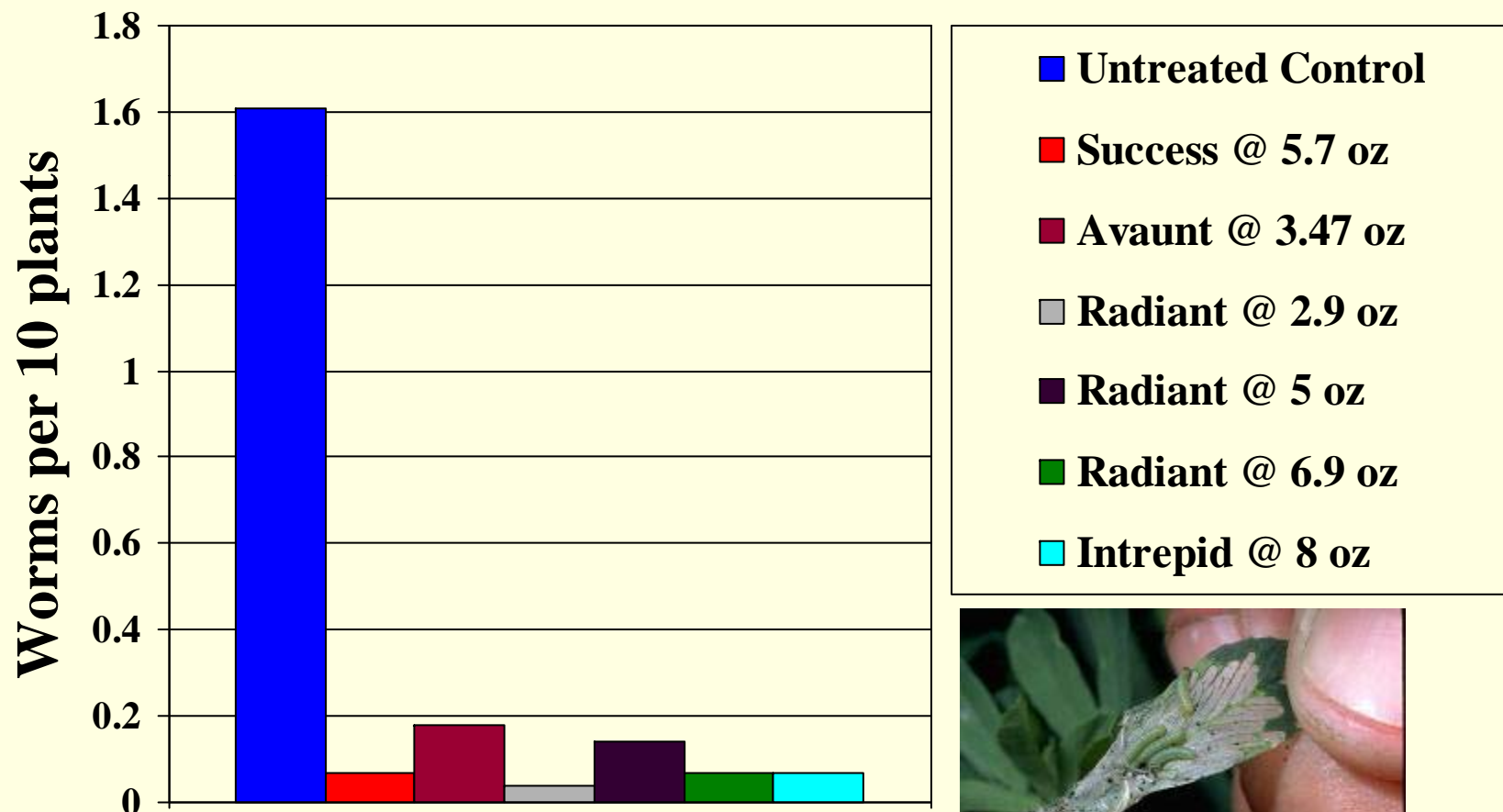
■ **Others**

- Avaunt[®] (a.i. indoxacard) DuPont (MoA 22)

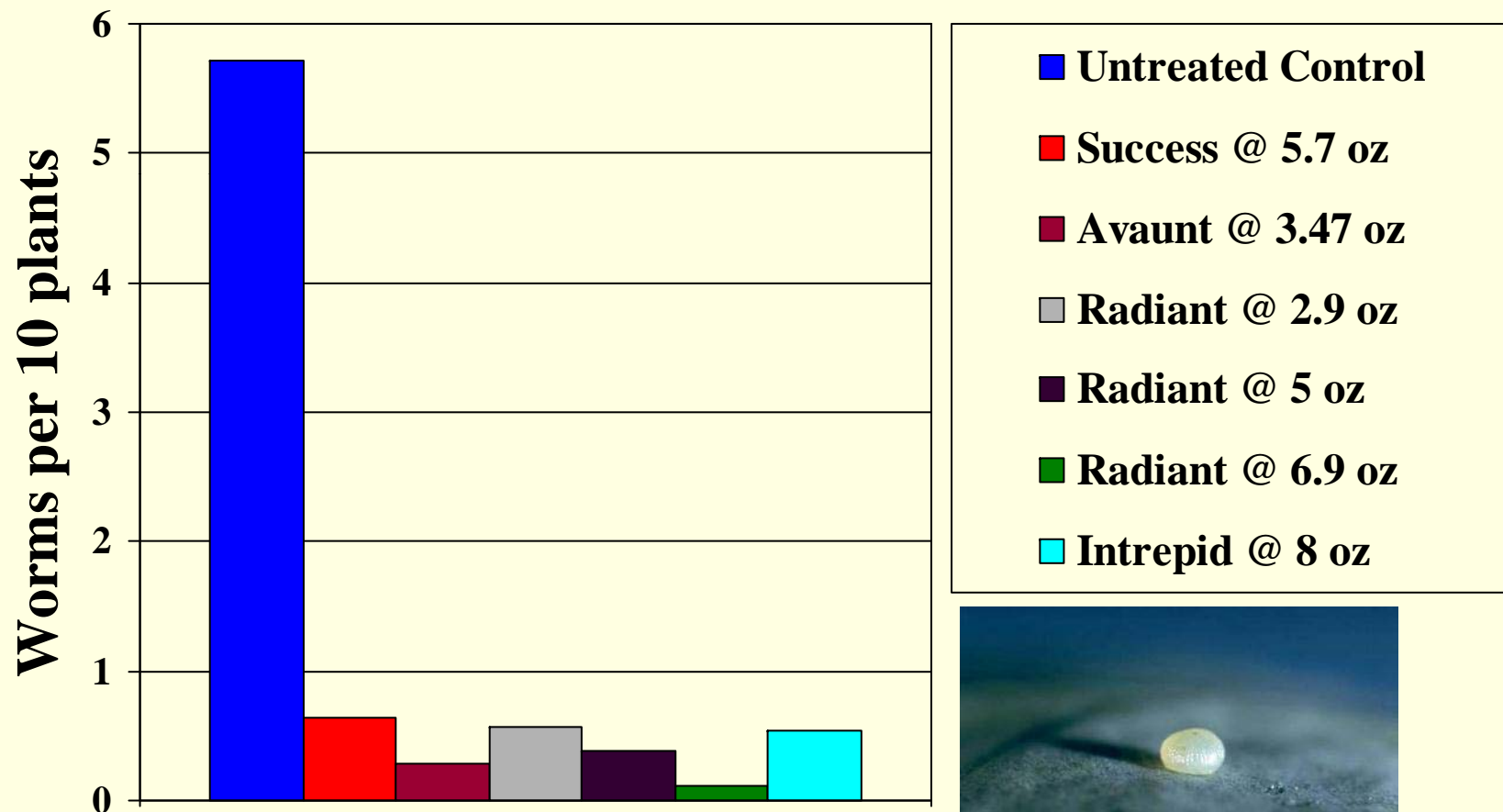
Insecticide Efficacy Against Worm Pests on Lettuce at Holtville, CA in 2010



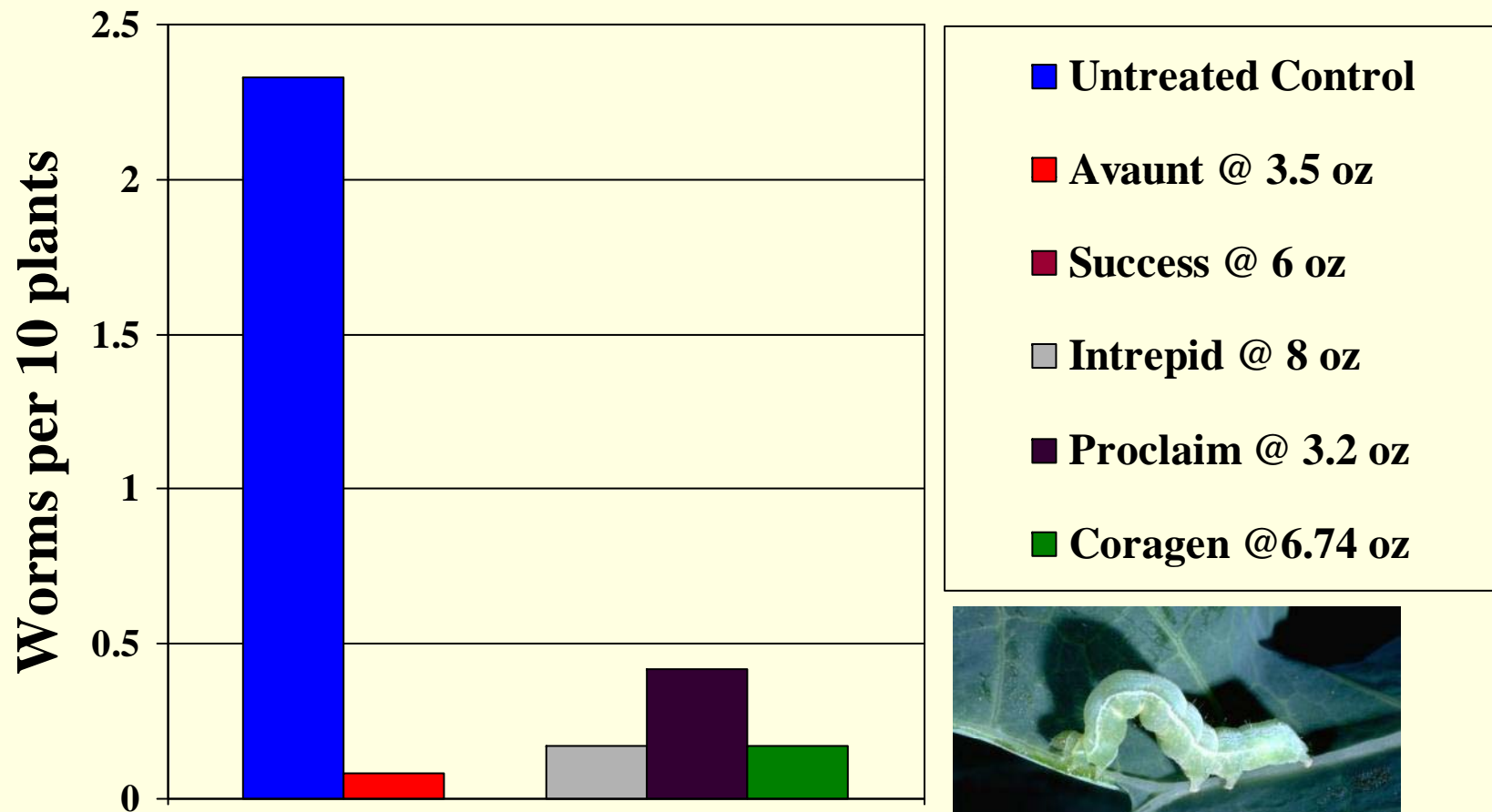
Beet Armyworm Post Treatment Means In Lettuce At Holtville, CA in 2006



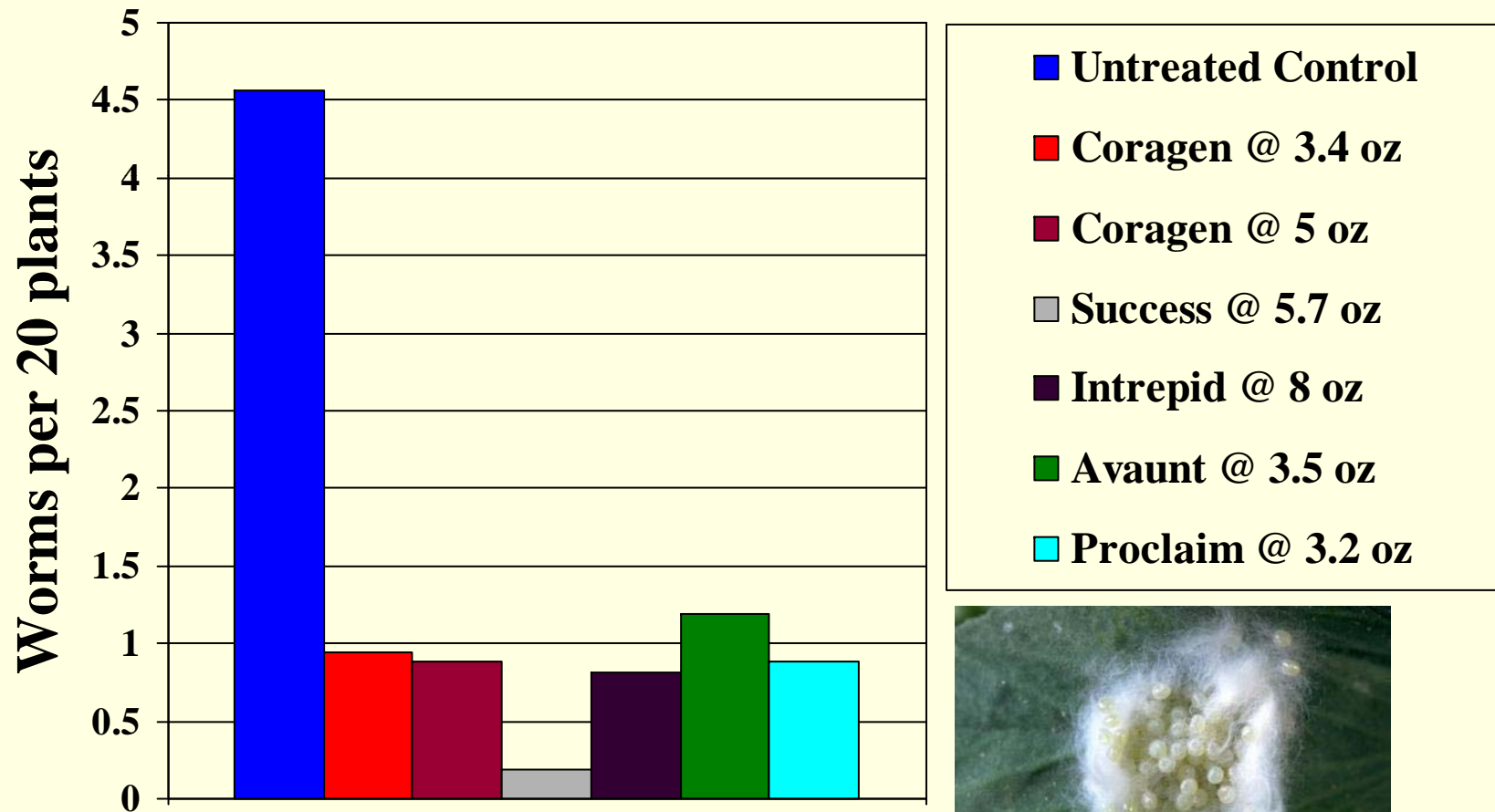
Cabbage Looper Post Treatment Means In Lettuce At Holtville, CA in 2006



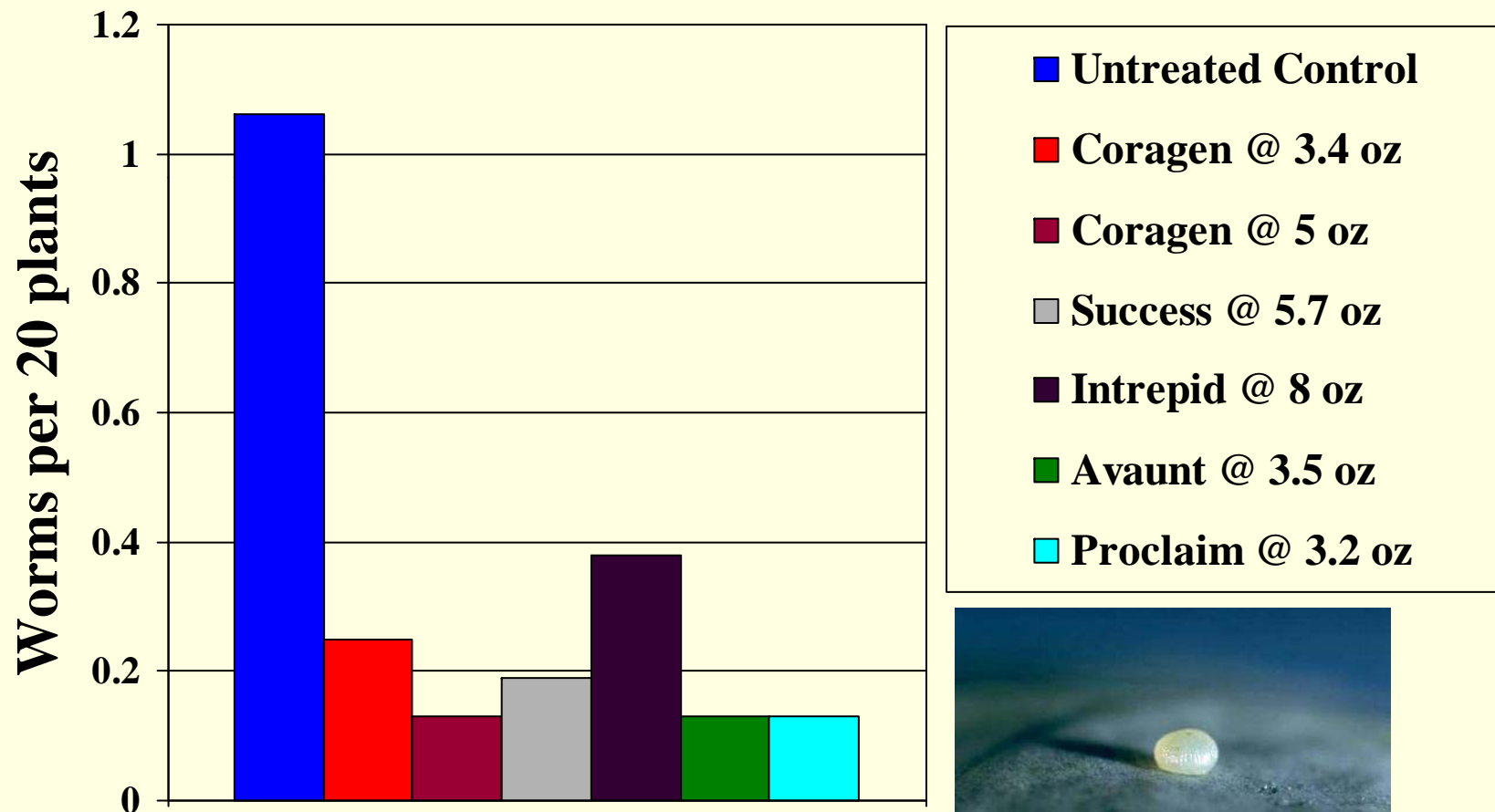
Cabbage Looper Post Treatment Means In Cucumber At Holtville, CA in 2006



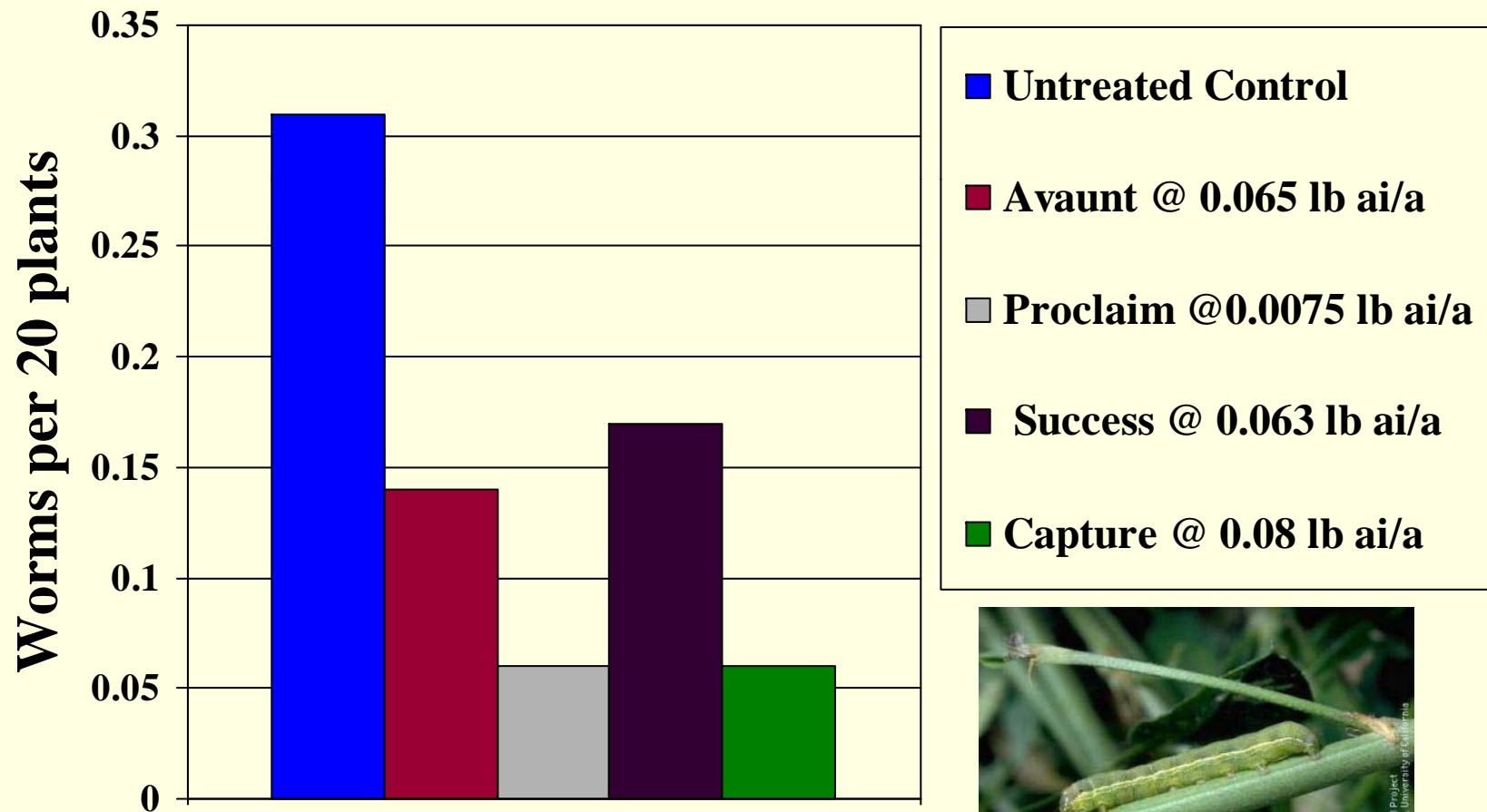
Beet Armyworm Post Treatment Means In Lettuce At Holtville, CA in 2005



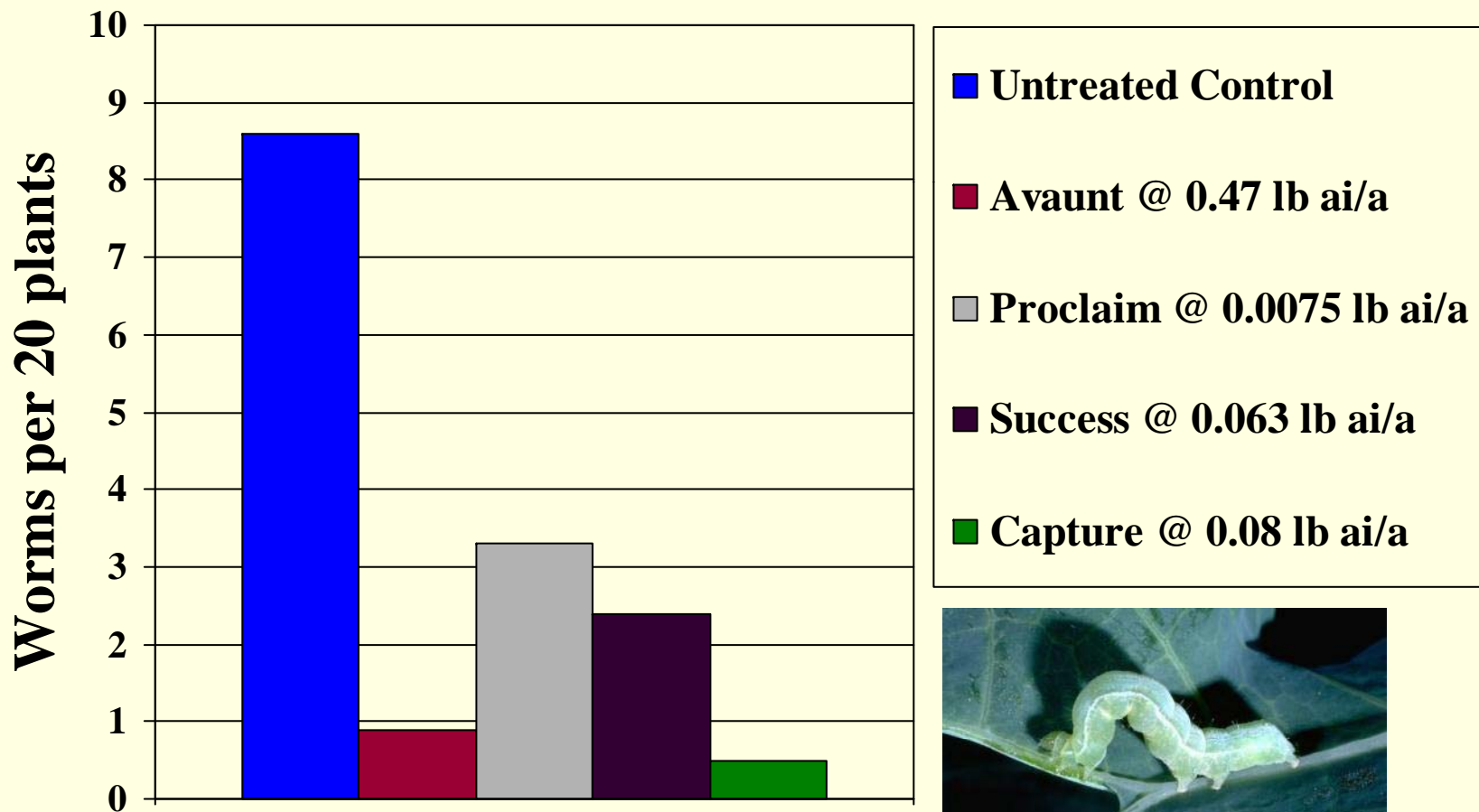
Cabbage Looper Post Treatment Means In Lettuce At Holtville, CA in 2005



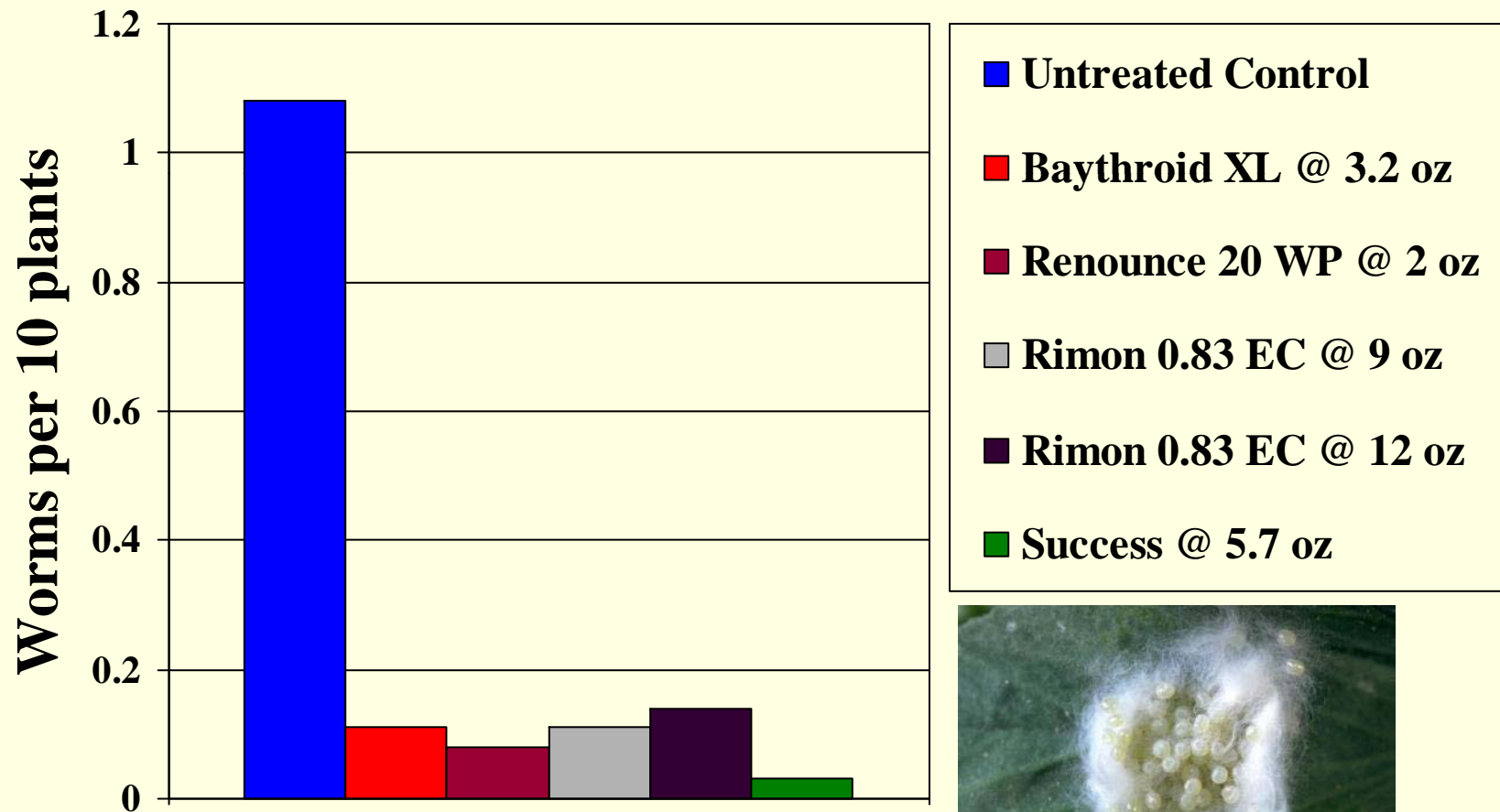
Beet Armyworm Post Treatment Means In Cauliflower At Holtville, CA in 2002



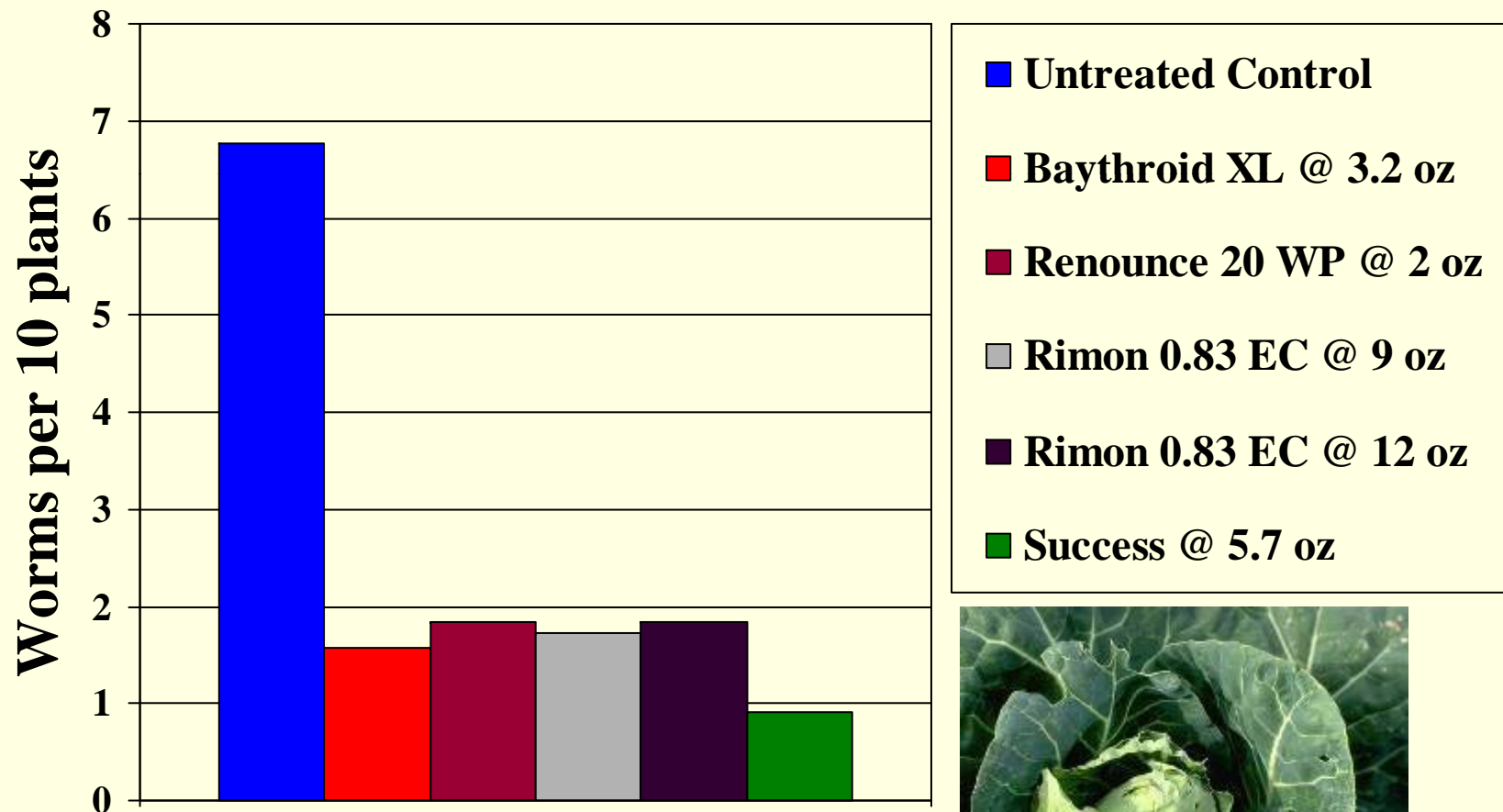
Cabbage Looper Post Treatment Means In Cauliflower At Holtville, CA in 2002



Beet Armyworm Post Treatment Means In Cabbage At Holtville, CA in 2006



Cabbage Looper Post Treatment Means In Cabbage At Holtville, CA in 2006



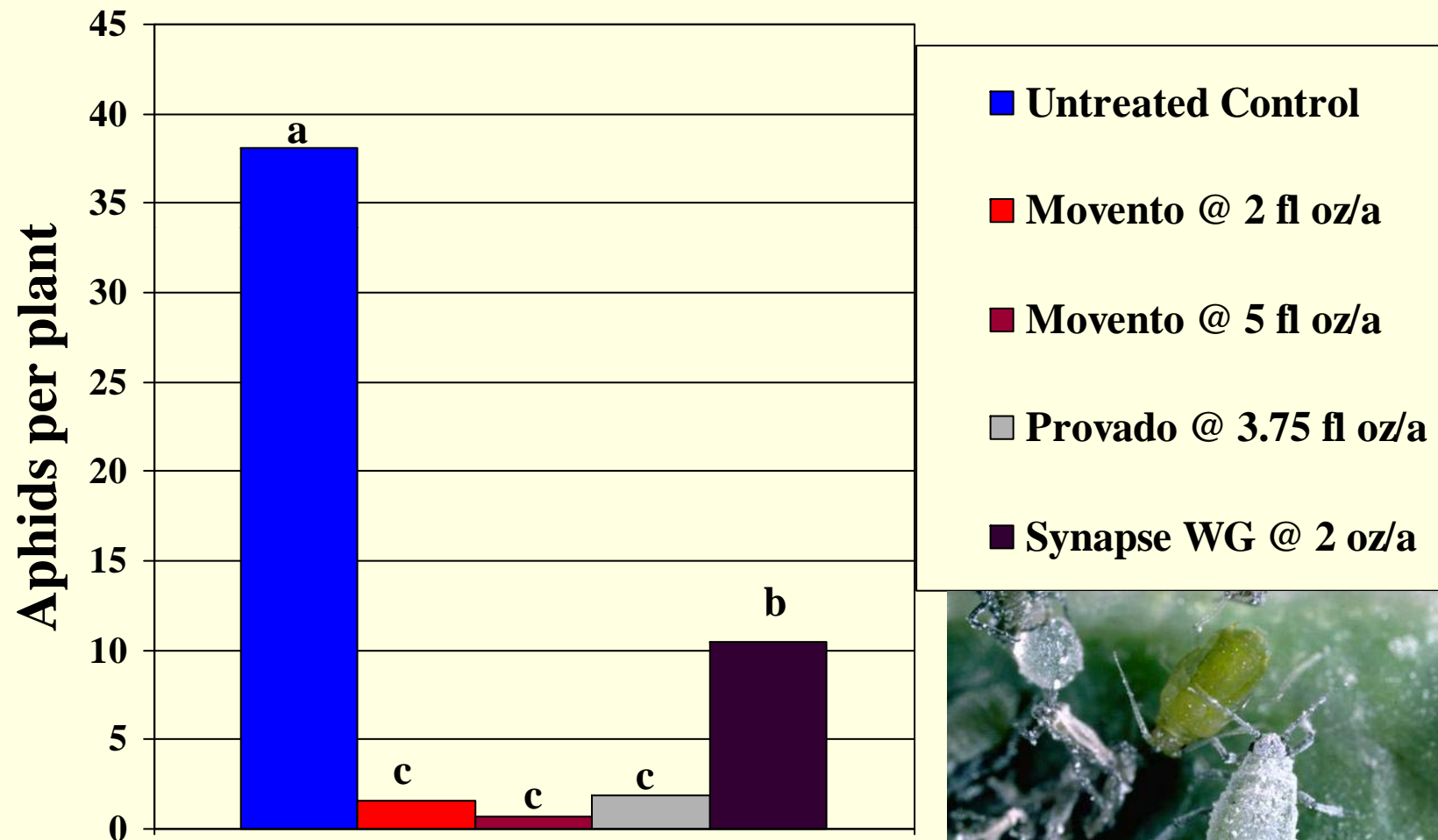
“Newer” Aphid Control Chemistries

- **Movento[®]** (spirotetramat) Bayer CropScience
 - (MoA 23)
- **Beleaf[®]** (flonicamid) FMC Corp.
 - (MoA 9C)
- **Closer** (a.i. sulfoxaflor under development by Dow AgriSciences) **No US EPA or Cal DPR label**
 - (MoA unknown)

“Older” Aphid Control Chemistries

- **Fulfill[®]** (a.i. pymetrozine) Syngenta (MoA 9B)
- **Neonicotinoids (MoA A4)** (several others not listed)
 - a.i. imidacloprid: Admire[®], Provado[®] and many generics
 - Assail[®] (a.i. acetamiprid) United Phosphorus, Inc.
 - Platinum[®] & Actara[®] (a.i. thiamethoxam) Syngenta
 - Venom[®] (a.i. dinotefuron) Valent
- **Organophosphates (MoA 1B)**
 - a.i. Dimethoate (Gowan & other sources)
 - MSR Spray[®] (a.i. oxydementon-methyl) Gowan
 - **Others not listed**

Insecticide Efficacy Evaluation for Aphid Control on Napa Cabbage at Holtville, CA in 2007



Thrips Control Insecticides

■ Spinosyns: (MoA 5)

- Success[®] & Entrust[®] (a.i. spinosad) Dow AgroSciences
- Radiant[®] SC (a.i. spinetoram) Dow AgroSciences

■ Carbamates: (MoA A1)

- Lannate[®] (a.i. methomyl) DuPont
- Vydate[®] (a.i. oxamyl) dry bulb onion supplemental label

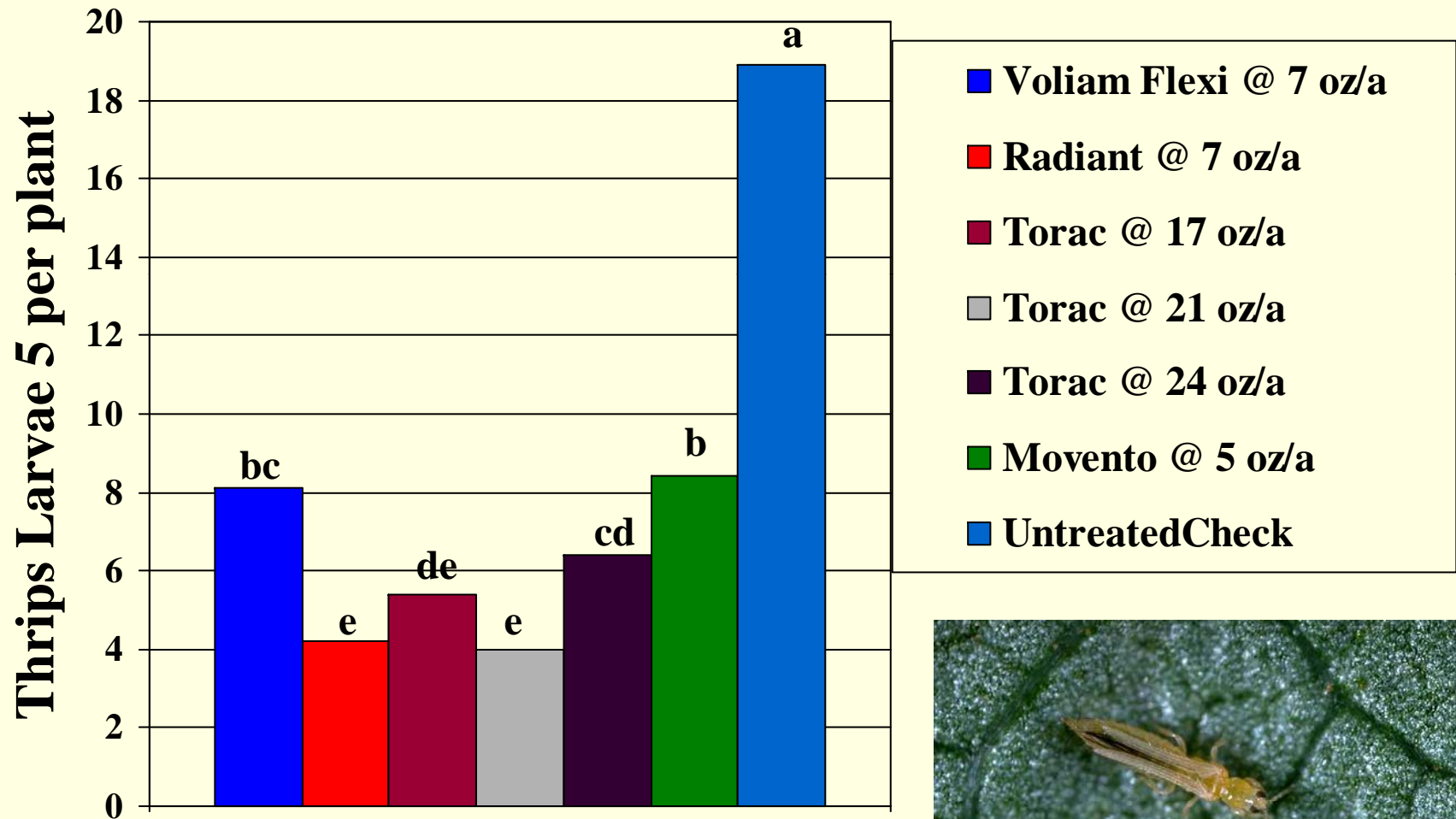
■ Pyrethroids: (MoA 3) (several others not listed)

- Mustang[®] (a.i. zeta-cypermethrin) FMC Corp.
- Warrior[®] (a.i. lambda-cyhalothrin) Syngenta

■ Others:

- a.i. Azadirachtin (various products) (MoA 18B)
- Torac (a.i. tolfenpyrad; under development Nichino Americas)

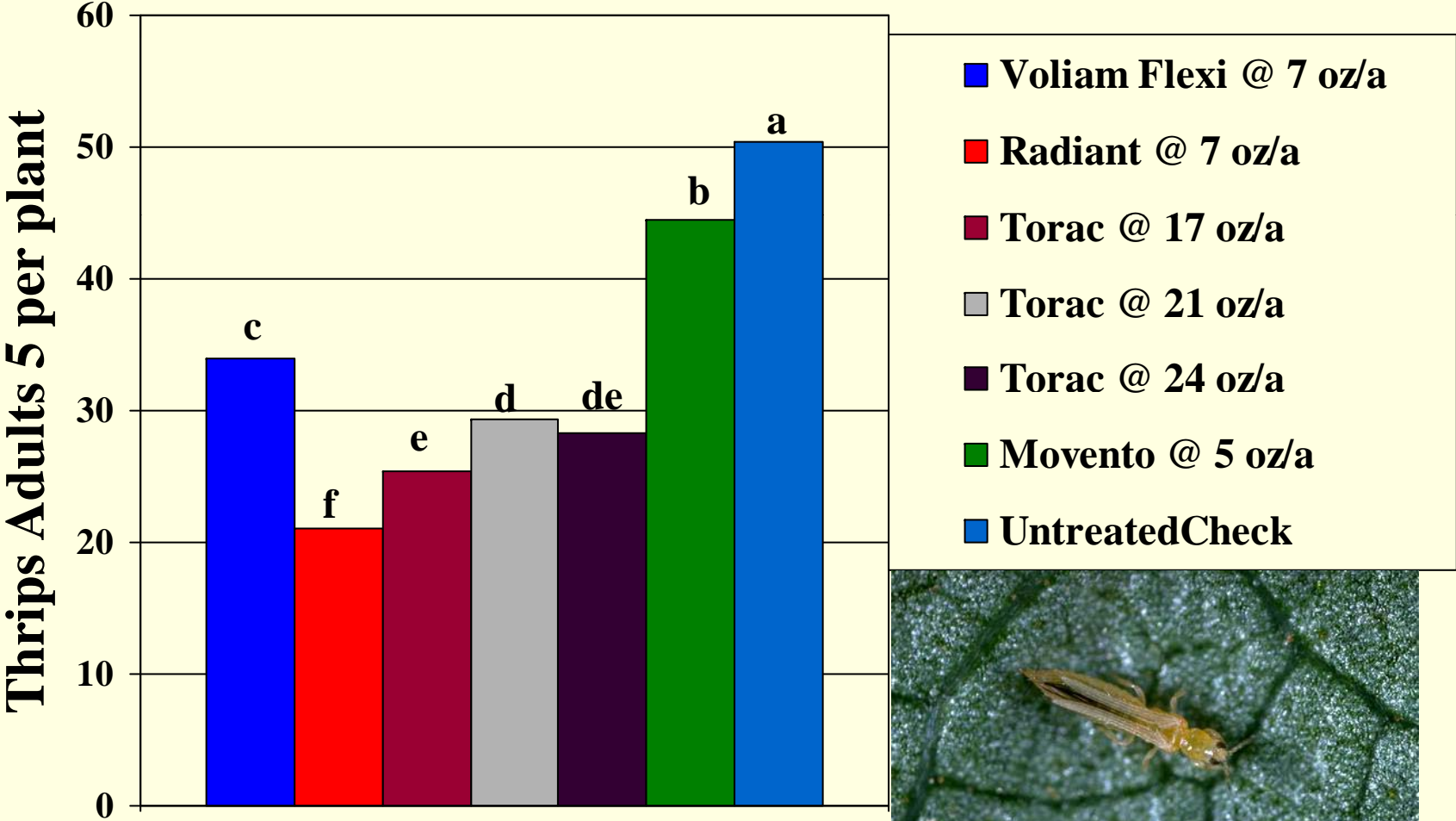
Insecticide Efficacy Evaluation for Thrips Control on Lettuce at Holtville, CA in 2009



Torac has no US EPA or Cal DPR label



Insecticide Efficacy Evaluation for Thrips Control on Lettuce at Holtville, CA in 2009



Torac has no US EPA or Cal DPR label



Onion Insecticides, Holtville, California, 2011.

Rotation 1

Mustang f/b **4.0 oz**
Lannate LV f/b **36.0 oz**
Radiant SC **8.0 oz**

Rotation 2

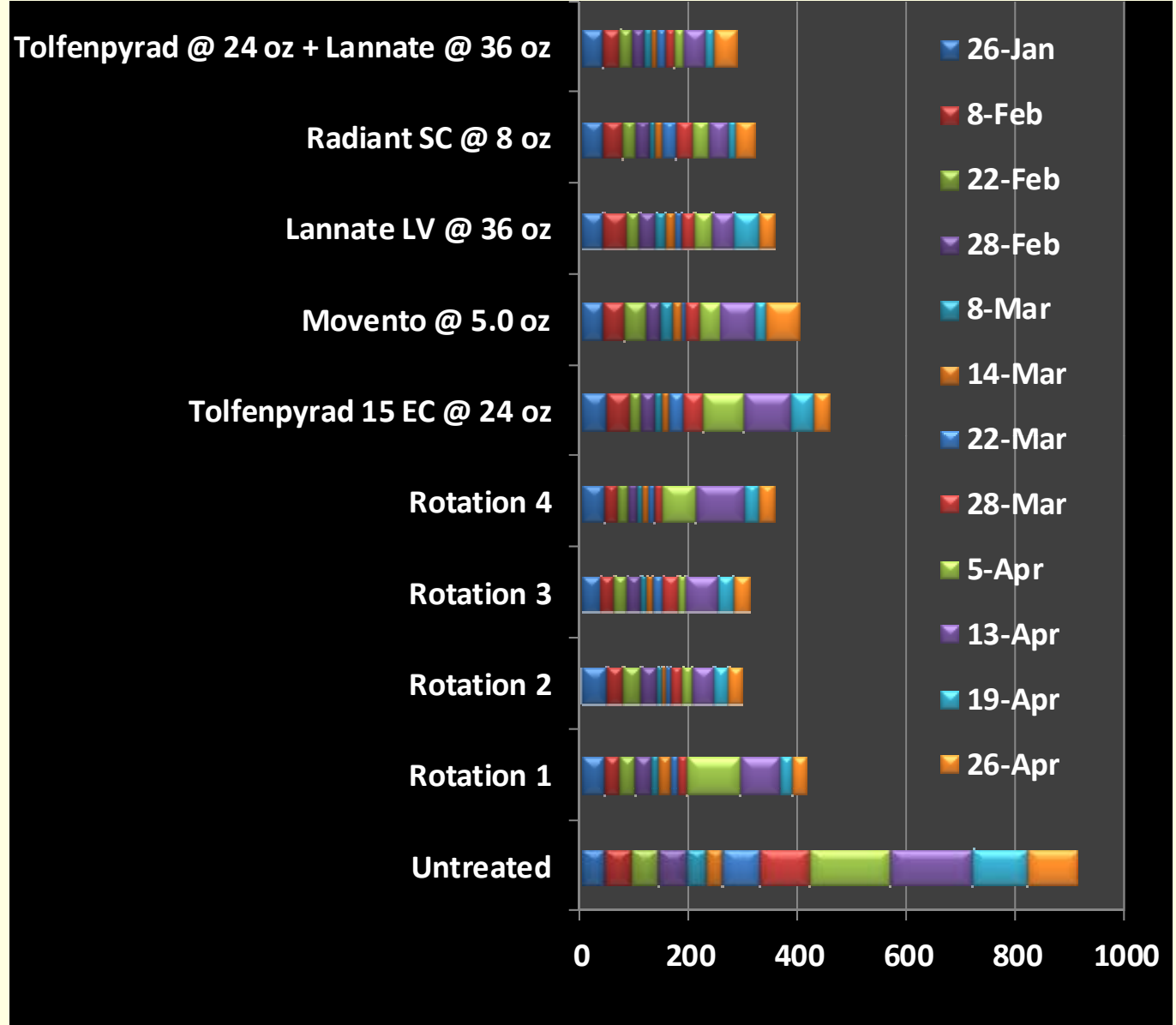
AdmirePro f/b **14.0 oz**
Movento f/b **5.0 oz**
Radiant SC **8.0 oz**

Rotation 3

AdmirePro f/b **14.0 oz**
Movento f/b **5 oz**
Lannate LV **36.0 oz**

Rotation 4

Torac f/b **24.0 oz**
Radiant SC f/b **8.0 oz**
Lannate LV f/b **36.0 oz**
Mustang **4.0 oz**



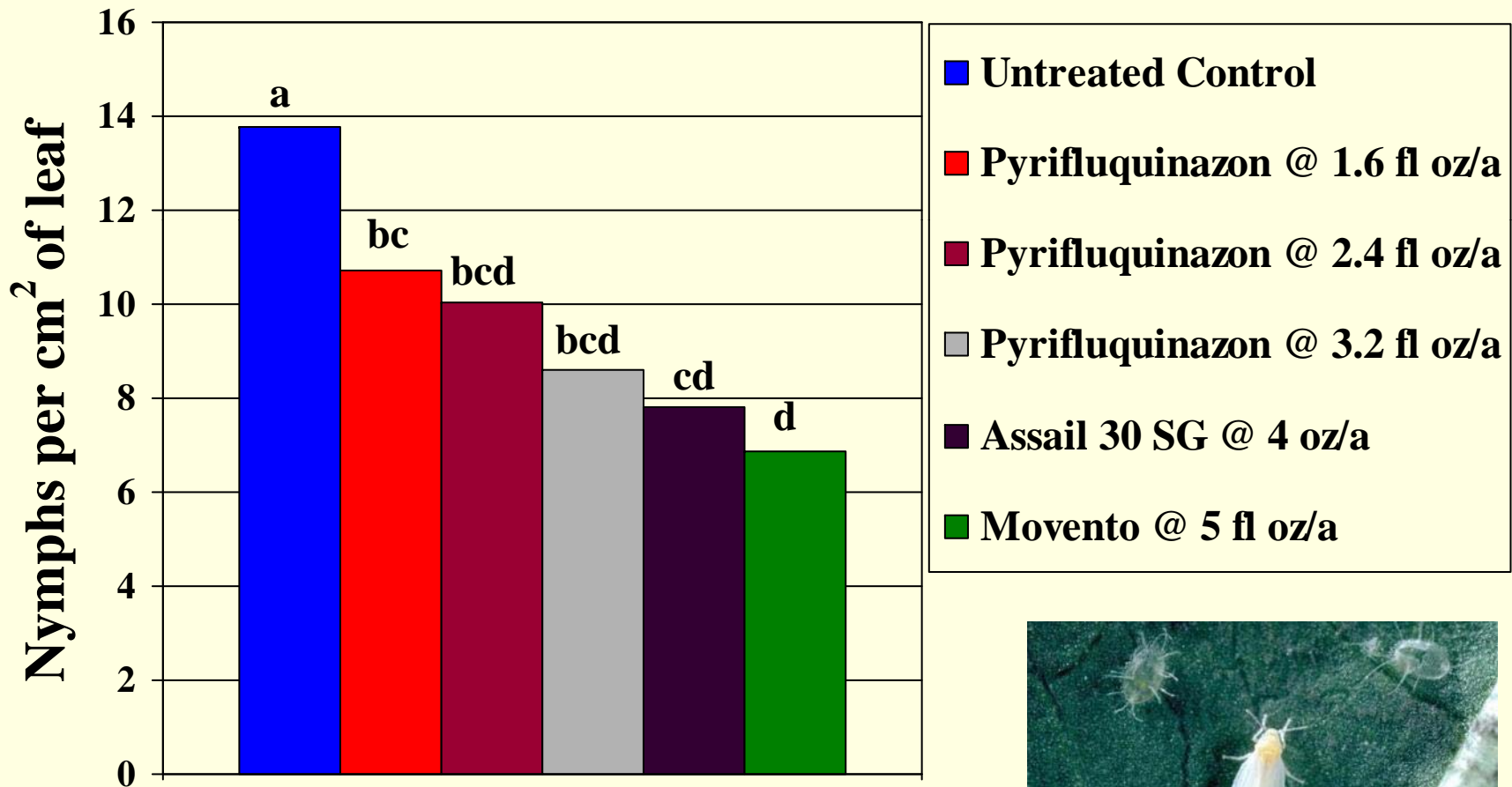
Torac has no US EPA or Cal DPR label

Thrips per 5 Plants

Whitefly Control Insecticides

- **Neonicotinoids: (MoA A4)**
 - a.i. imidacloprid: Admire[®], Provado[®] and many generics
 - Assail[®] (a.i. acetamiprid) United Phosphorus, Inc.
 - Platinum[®] & Actara[®] (a.i. thiamethoxam) Syngenta
 - Venom[®] (a.i. dinotefuron) Valent
- **Tetronic acid derivatives: (MoA 23)**
 - Movento[®] (a.i. spirotetramat) Bayer CropScience
 - Oberon[®] (a.i. spiromesifen) Bayer CropScience
- **Pyrethroids: (MoA 3)**
 - Brigade[®] Capture Cal 2EC[®] (a.i. bifenthrin) FMC Corp.
- **Anthranilic Diamide Insecticide: (MoA 28)**
 - Coragen[®] SC (a.i. chlorantraniliprole) DuPont
 - a.i. cyantraniliprole (under development) DuPont
- **Other: (MoA's unknown)**
 - a.i. pyrifluquinazon (under development) Nichino Americas
 - Torac (a.i. tolfenpyrad; under development Nichino Americas)

Whitefly Seasonal Averages In Broccoli At Holtville, CA in 2010

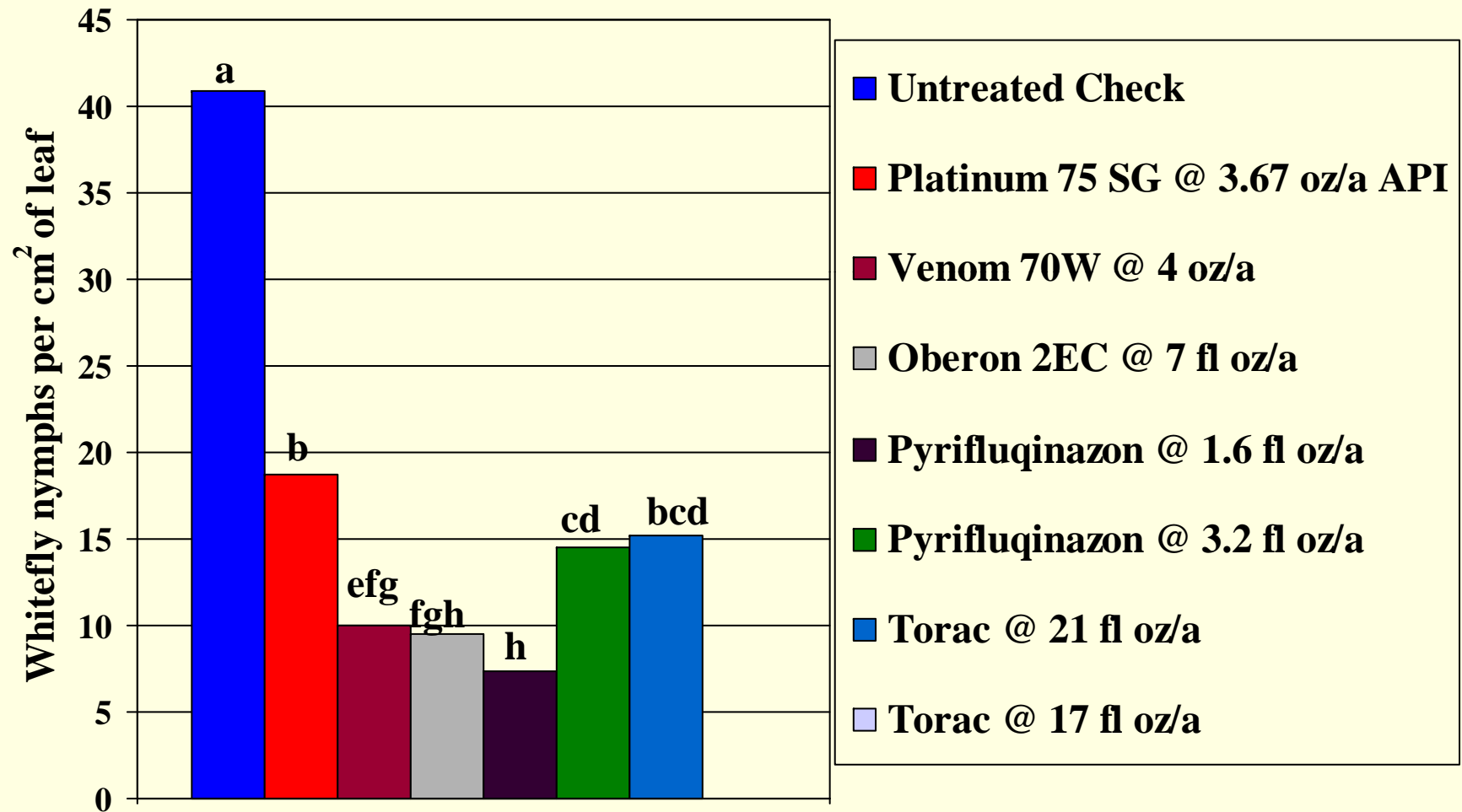


Pyrifluquinazon has no US EPA or Cal DPR label



UC Statewide IPM Project
© 2001 Regents, University of California

Insecticide Efficacy Evaluation for Whitefly Control on Canteloupe at Holtville, CA in 2009



Torac & Pyriproxyfen do not have US EPA or Cal DPR labels

Insecticides: “Old” versus “New”

Old Vegetable Insecticides

■ Pro

- Less expensive
- Broad spectrum
- IRM rotation partner
- Fits existing IPM program

■ Con

- Worker safety issues
- Environmental issues
- Insecticide-resistance
- Broad spectrum

New Vegetable Insecticides

■ Pro

- Selective
- More efficacious
- IRM rotation partner
- Fits new IPM program
- Environmentally friendly
- Improved worker safety

■ Con

- More expensive
- Too selective
- Less efficacious

In-the-Can Insecticide Mixtures

- Athena[®] (bifenthrin & abamectin B1) FMC
- Brigadier[®] (bifenthrin & imidacloprid) FMC
- Cobalt (chlorpyrifos & gamma-cyhalothrin) Dow AgroSciences
- Durivo[®] (chlorantraniliprole & thiamethoxam) Syngenta
- Hero[®] (zeta-cypermethrin & bifenthrin) FMC
- Leverage (imidacloprid & beta-cyfluthrin) Bayer
- Stallion (zeta-cypermethrin & chlorpyrifos) FMC
- Steed[®] (zeta-cypermethrin & bifenthrin) FMC
- Vetica[®] (flubendiamide & buprofezin) Nichino Americas
- Voliam[®] Flexi (chlorantraniliprole & thiamethoxam) Syngenta
- Voliam[®] Xpress (chlorantraniliprole & lambda-cyhalothrin) Syngenta

In-the-Can Mixtures: Why? or Why Not?

■ Pros:

- Cheaper than “In-the-Tank” mixtures
- Convenient for mixing and loading of the sprayer
- “New” product for the company with “old” a.i.
- Broad spectrum insect control

■ Cons:

- Confounds insecticide resistance management (IRM)
- Environmental exposure of a.i. when a pest is not present
- May not be more efficacious than one a.i.
- Takes tank mix decision away from PCA or grower

Older Worm Control Insecticides

- “Newer is not always better”
- Many older chemicals are still used safely, effectively and some are “Reduced Risk”
- Several pyrethroid insecticides and Avaunt insecticide are still efficacious
- Success and Proclaim are still an efficacious “Soft” insecticides
- Intrepid 2 SC, Coragen, Synapse are some “newer” vegetable worm control insecticides that are “Soft” or “Reduced Risk”

Suggested Use Patterns for Older and New Worm Insecticides on Winter Vegetables

- Stand Establishment is a critical time for worm control.
 - Older insecticides (Avaunt, Lannate, OPs & Pyrethroids)
 - New insecticides (Belt, Coragen, Durivo & Radiant)
- Post thinning to head development is a time when more worm damage can be tolerated.
 - Older insecticides (Intrepid, Lannate, Proclaim, OPs & *B.t.*)
 - New insecticides (Belt, Coragen, Voliam Flexi & Rimon)
- Head development to harvest is a time when worm control is critical.
 - Older insecticides (Avaunt, Intrepid & Proclaim)
 - New insecticides (Belt, Coragen, Voliam Xpress & Radiant)

New & Old together for IPM and IRM

- With older and newer insecticides together we have an arsenal of products that can be efficacious for vegetable pest management many years to come.
- Vegetable IPM: Cultural control practices, along with proper sampling and timing of reduced risk insecticides, can be provide both efficacious and environmentally sound crop protection from insects.
- Insecticide resistance management (IRM): With several chemical classes and MoA's, insecticide resistance can be managed for years to come.