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Agriculture and Natural Resources

Making a Difference for California

Thrips Management on Lettuce and Overview of the European Pepper Moth

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Affiliated IPM Advisor**

Santa Barbara and San Luis Obispo Counties

Western flower thrips *Frankliniella occidentalis*



2011 Experimental design

Treatments

1. Untreated control
2. Assail 70 WP (acetamiprid) 1.7 oz + DyneAmic (NIS) 0.25% v/v
3. Radiant SC (spinetoram) 7 fl oz + Dyne Amic 0.25%
4. Lannate SP (methomyl) 0.75 lb + DyneAmic 0.25%
5. Torac 15 EC (tolfenpyrad) 21 fl oz + DyneAmic 0.25%
6. Lannate SP 0.75 lb + Torac 15EC 21 fl oz + DyneAmic 0.25%



2	3
3	1
1	2
6	5
5	6
4	4
5	6
4	5
6	4
3	2
1	3
2	1

Spraying 35 gal/acre at 55 psi with flat fan nozzle

Plot size 5 rows, 5.33' wide 10' long bed replicated 4 times

Head lettuce Cultivar Durango

Planted 8 June, 2011

Treated on 13 July, 2011

Insecticides-Modes of Action

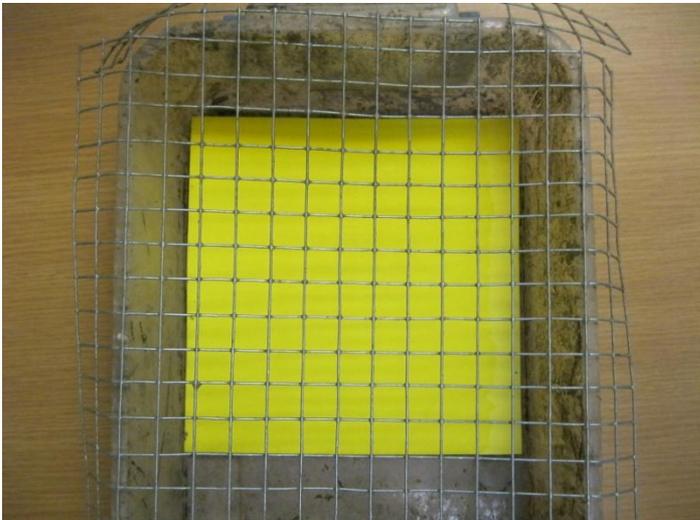
Insecticide	Chemical Group	IRAC Group	Mode of Action
Assail 70 WP (acetamiprid)	4A	Neonicotinoid	Nicotinic acetylcholine receptor agonist/antagonist
Radiant SC (spinetoram)	5	Spinosyn	Nicotinic acetylcholine receptor agonist (allosteric)
Lannate SP (methomyl)	1A	Carbamate	Acetylcholine esterase inhibitor
Torac 15 EC (tolfenpyrad)	21	METI acaricide	Mitochondrial complex I electron transport inhibitor

Sampling

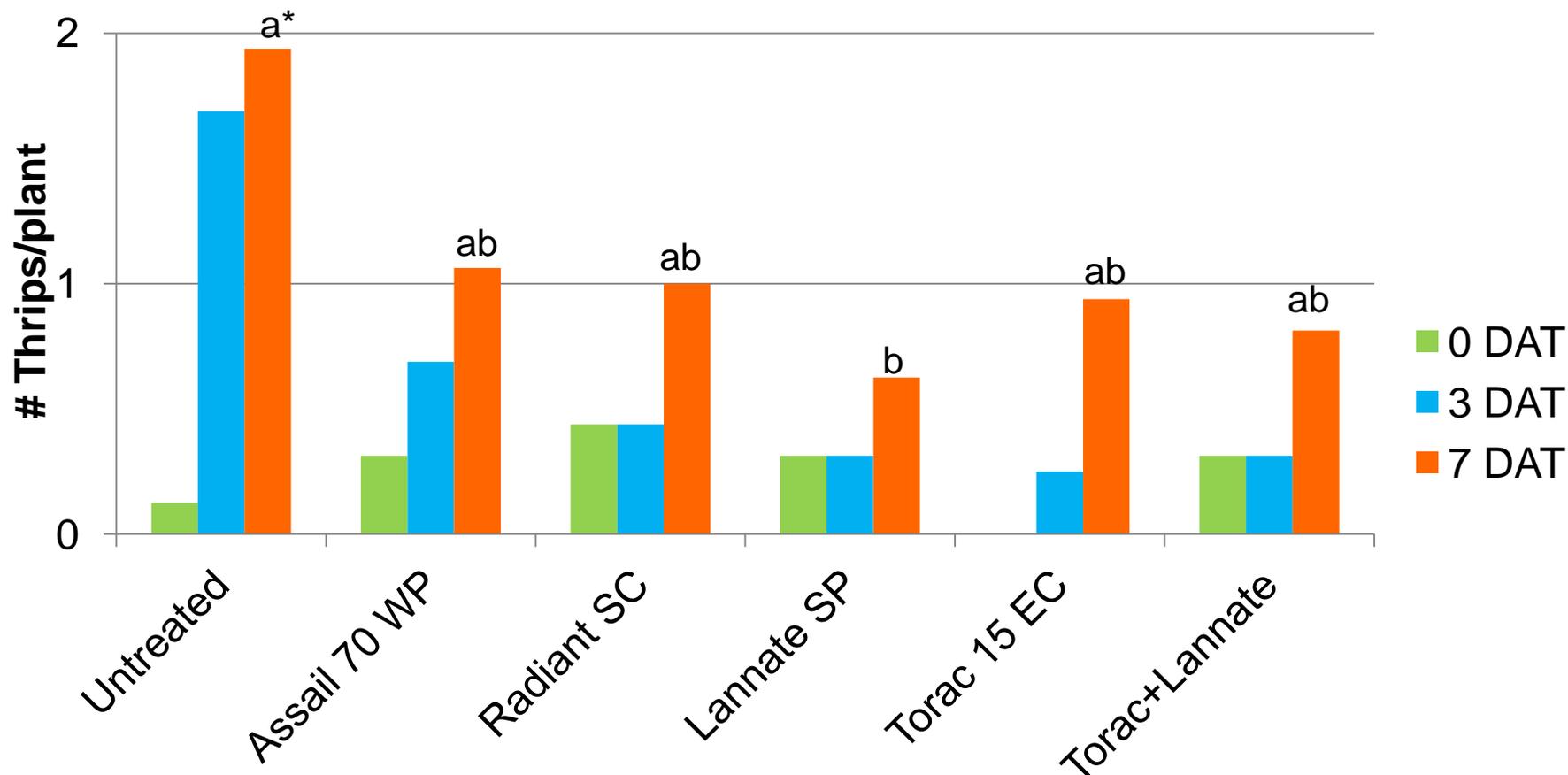
Treatment and sampling

- Pre-treatment sampling
- 1st spray on 7/13/11 and sampling 3 and 7 days after treatment (DAT)
- 2nd spray on 7/22/11 and sampling on 3, 7 and 11 DAT
- 3rd spray on 8/3/11 and sampling on 3 and 7 DAT

- Thrips sampled from 4 random plants from each plot

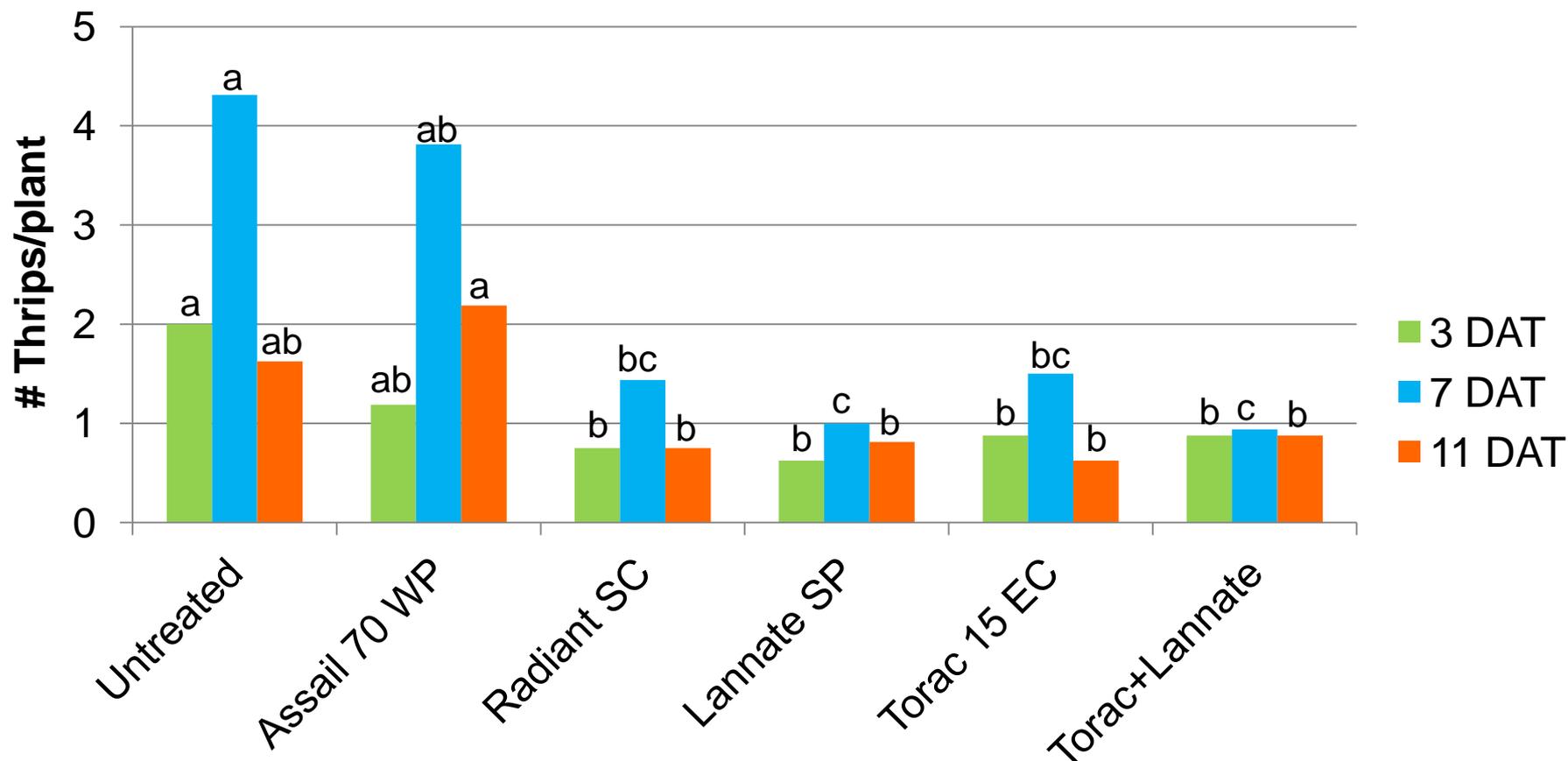


2011 Results – 1st spray treatment



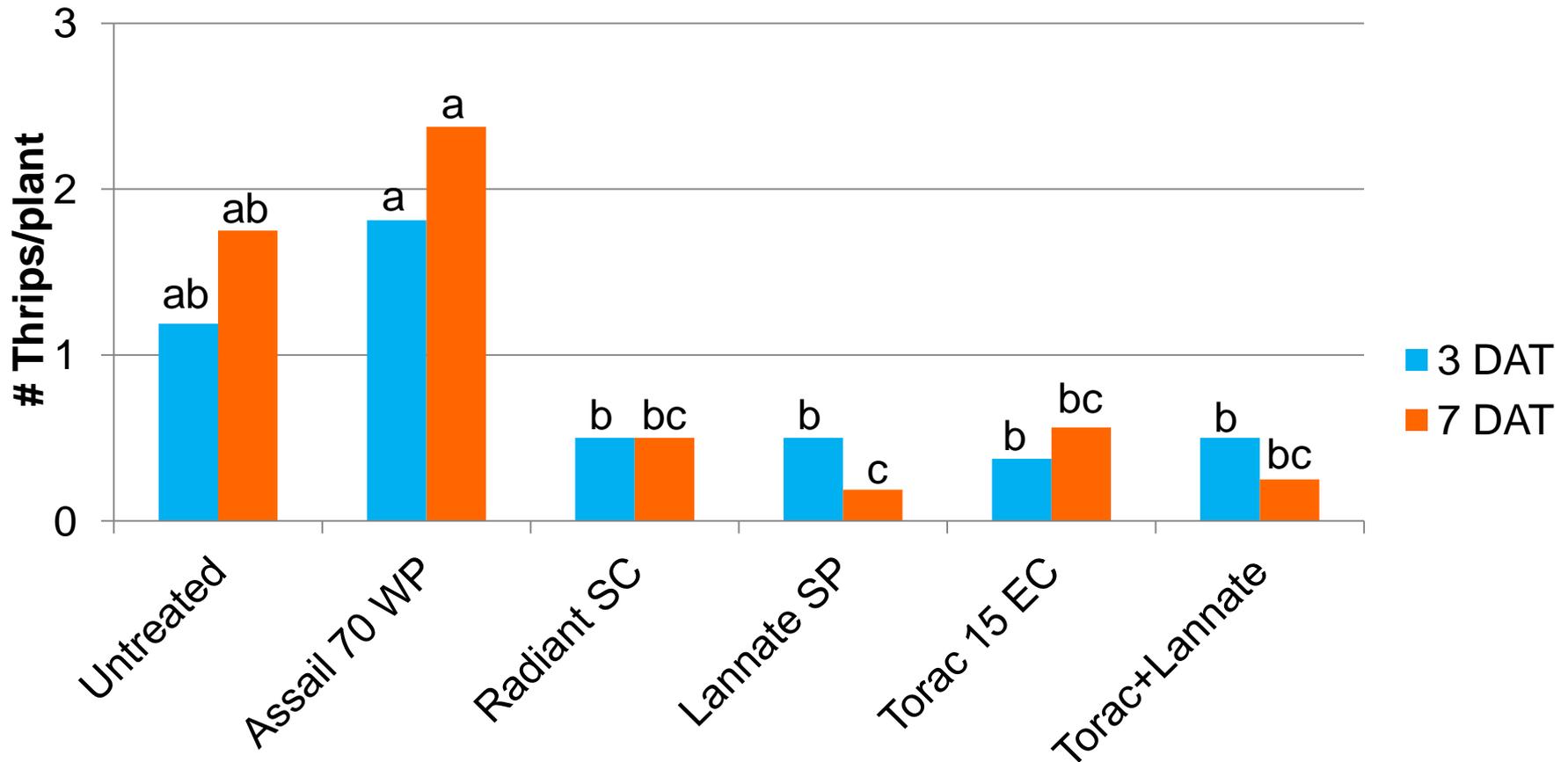
*Significant differences based on total number/4 plants

2011 Results – 2nd spray treatment



*Significant differences based on total number/4 plants

2011 Results – 3rd spray treatment



*Significant differences based on total number/4 plants

2012 Experimental design

Treatments

1. Untreated control
2. Assail 30 SC (acetamiprid) 4 oz
+ DyneAmic (NIS) 0.1% v/v
3. Radiant SC (spinetoram) 8 fl oz
+ Dyne Amic 0.25%
4. BotaniGard 22 WP (*Beauveria bassiana*) 2 lb
+ DyneAmic 0.125%
5. Torac 15 EC (tolfenpyrad) 21 fl oz
+ DyneAmic 0.25%
6. Torac 15EC 21 fl oz + Lannate SP 0.75 lb
+ DyneAmic 0.25%
7. NNI-1171 21 fl oz (new ai)
+ DyneAmic 0.25%



Spraying 50* gal/acre at 70 psi with flat fan nozzle
(*100 gpa for BotaniGard)

Plot size 5 rows, 5.33' wide 10' long bed replicated 4 times

Treated on 16 May, 2012

2	1	2	3
1	3	3	1
3	4	1	4
4	2	4	2
6	7	7	5
7	5	6	7
5	6	5	6
I	II	III	IV
BLOCKS			

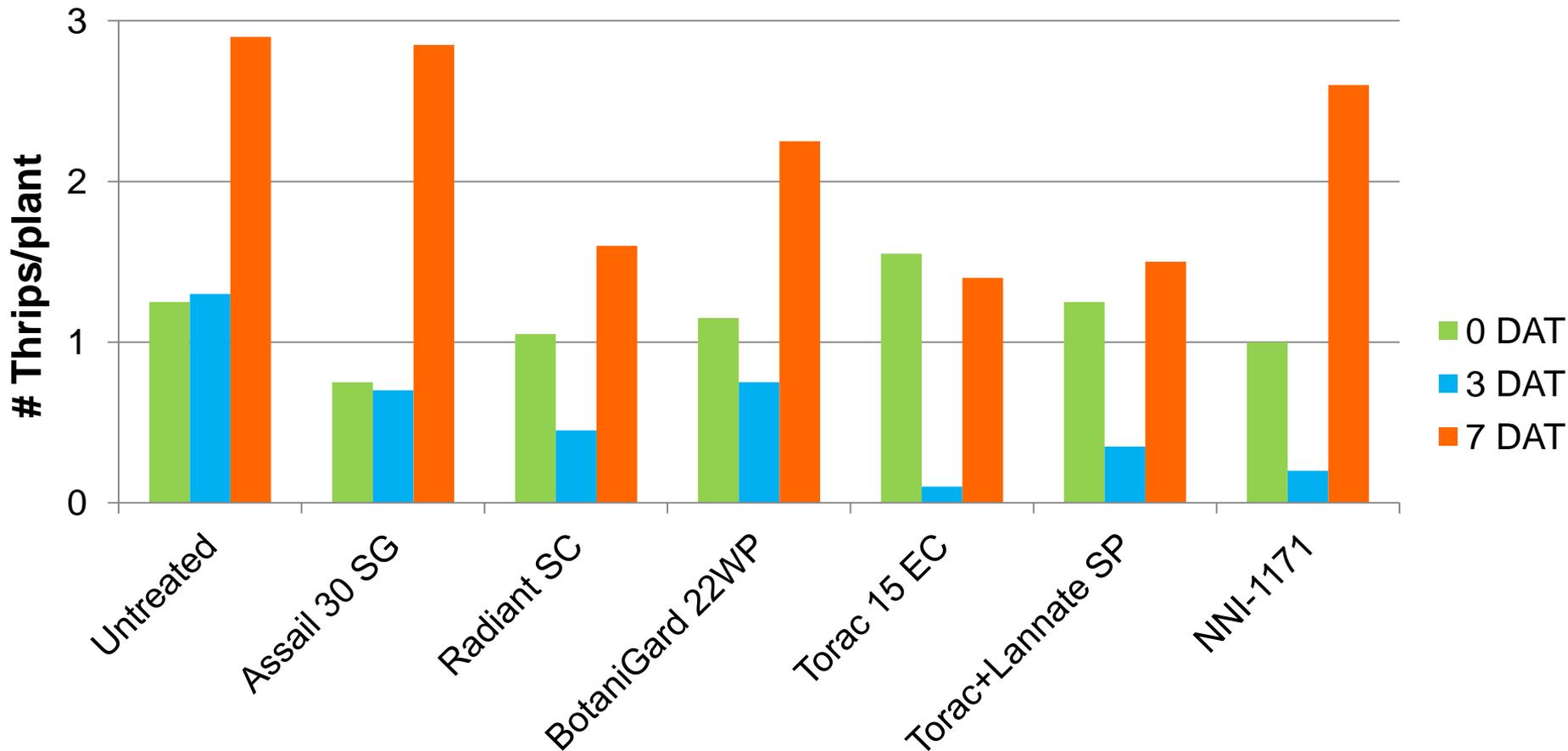
Insect pathogenic fungus, *Beauveria bassiana*

Fungal pathogen, *Beauveria bassiana* on cadaver of western flower thrips

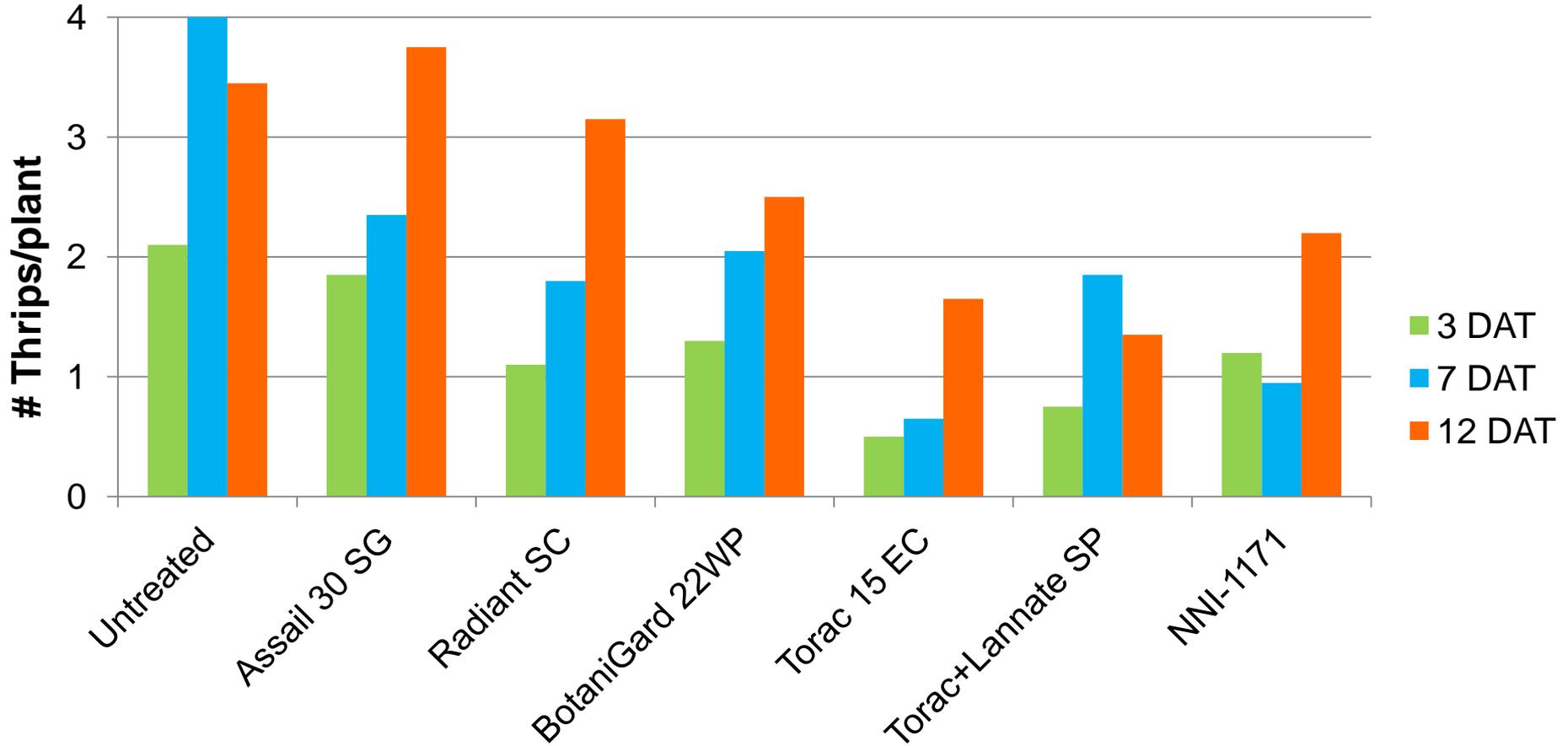


<http://cisr.ucr.edu>

2012 Results – 1st spray treatment



2012 Results – 2nd spray treatment



Acknowledgments

- Frank Costa, Ocean View Flowers
- Pedro Hernandez, Nichino America
- Curtis Engle, United Phosphorus
- Jesse Richardson, Dow AgroSciences



European pepper moth

- *Duponchelia fovealis* belongs to the grass moth or close-wing moth family Crambidae
- Native to the Mediterranean region and a greenhouse pest in the Netherlands
- First discovered in San Diego Co in 2004
- Widespread in California
- Present in Arizona, Colorado, Florida, Georgia, Oklahoma, and Texas
- Wide host range including corn, peppers, tomatoes, squash, strawberries, and ornamentals



European pepper moth-Life stages



European pepper moth-Eggs



Carmelo Peter Bonsignore,
Università degli Studi
Mediterranea di Reggio Calabria



Lance Osborne, Univ of Florida



Pasquale Trematerra, Univ of Molise, Italy

- Eggs 0.5-0.7 mm and oval shaped
- Whitish green initially, turn pink, then red and eventually brown with mature
- Laid singly or in groups of 3-10 in roof-tile pattern
- Females lay up to 200 eggs
- Duration 4-9 days
- Found underside of leaves, on stems, plant base and in top layer of soil



European pepper moth-Larvae



Lyle Buss, Univ of FLoridaCalabria

- Creamy white to light brown with dark head capsule and brown or grays spots
- Grow from 1.5 mm at hatching to 20-30 mm at maturity
- Duration 3-4 weeks
- Feed on roots, stems, foliage, inflorescence and fruits



Henk Stigter, Plant Protection Service,
National Reference Centre, The Netherlands



B Vander Mey, UCCE, San Diego



European pepper moth-Damage

Marja van der Straten, Plant Protection Service,
Wageningen, The Netherlands



Carmelo Peter Bonsignore, Università degli Studi
Mediterranea di Reggio Calabria



Henk Stigter, Plant Protection Service, National
Reference Centre, The Netherlands



European pepper moth-Pupae



James Hayden, Florida DACS, Divi of Plant Industry



Henk Stigter, Plant Protection Service,
National Reference Centre, The Netherlands

- Yellowish to light brown initially and turn dark with maturity
- About 9-12 mm long
- Cocoon 15-19 mm long and spun with silk, frass, and soil particles under the foliage, below the soil line or attached to the pots.
- Duration 1-2 weeks



European pepper moth-Adults

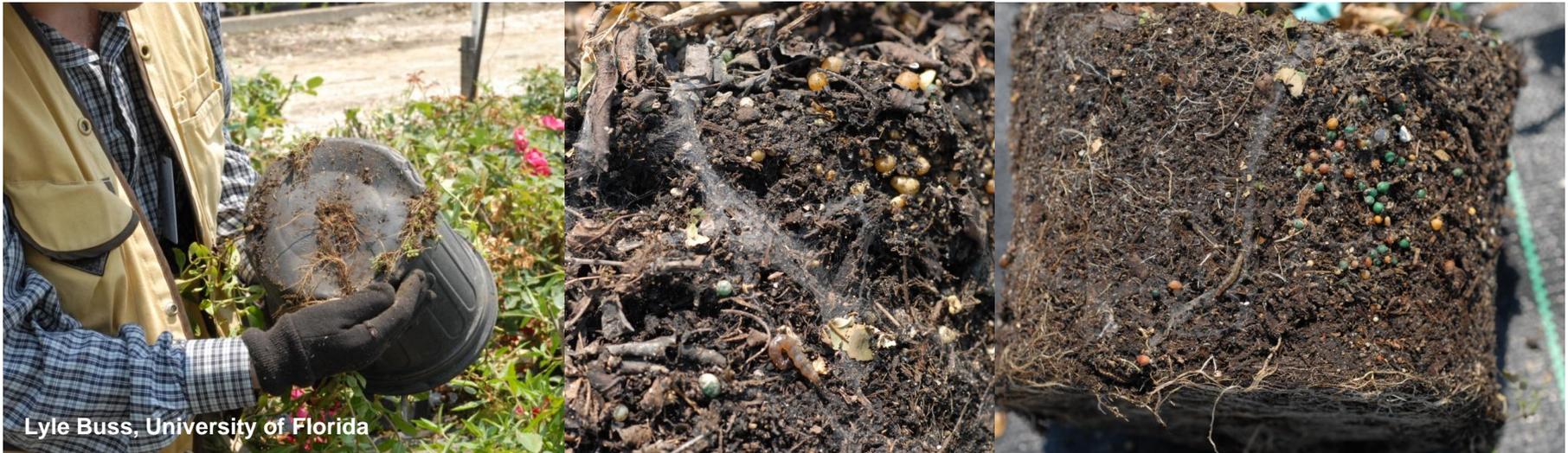


- Adults have brown to grey wings with a wing span of about 20 mm and are good fliers.
- Males have a long, slender abdomen that is turned upwards.
- Length of the life cycle depends on temperature, but varies from 6-8 weeks.



European pepper moth-Detection

- Look for signs of damage (leaf wilting, stem collapse) and presence (webbing, frass, life stages)
- Check where leaves touch the soil
- Base of the pots in container plants



Lyle Buss, University of Florida



European pepper moth-Control

- Chemical control:** Acephate, azadirachtin, chlorpyrifos, emamectin, imidacloprid, pyrethrins, and spinosad
- Cultural control:** Sanitation and using drier potting medium
- Biological control:** *Bt* products, predatory mites (*Stratiolaelaps miles*, *Hypoaspis miles* and *H. aculeifer*), predatory beetle (*Dalotia coriaria*), parasitoid wasps (*Trichogramma evanescens* and *T. cacoeciae*), and entomopathogenic nematodes (*Heterorhabditis bacteriophora* and *Steinernema* sp.)
- <http://ucanr.org/blogs/strawberries-vegetables>



Thank you!

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Blogs: <http://ucanr.org/blogs/strawberries-vegetables/>
<http://ucanr.org/blogs/pestnews/>

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www.twitter.com/calveggies

