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UC Cooperative Extension | University of California Agriculture and Natural Resources

Thinking Outside the Box: UCCE Research and Extension

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ucanr.org/strawberries-vegetables and ucanr.org/pestnews

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Outline

- Microbial control of strawberry and vegetable pest
- Entomopathogenic fungi as plant growth enhancers
- Greenhouse strawberry production in Europe
- Research and outreach with invasive and endemic pests and diseases

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Microbial control

Using microorganisms such as bacteria, fungi, nematodes, and viruses for managing pest populations

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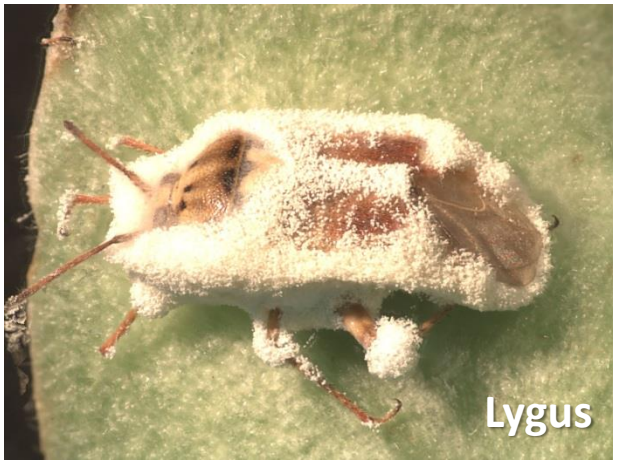
Potential of entomopathogens

- Entomopathogens like *Beauveria bassiana* and *Metarrhizium brunneum* are pathogenic to several pests



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Microbial control strategy

- Foliar application
- Endophytic colonization

- Pest management
- Promotion of plant growth
- Possible protection from pathogens

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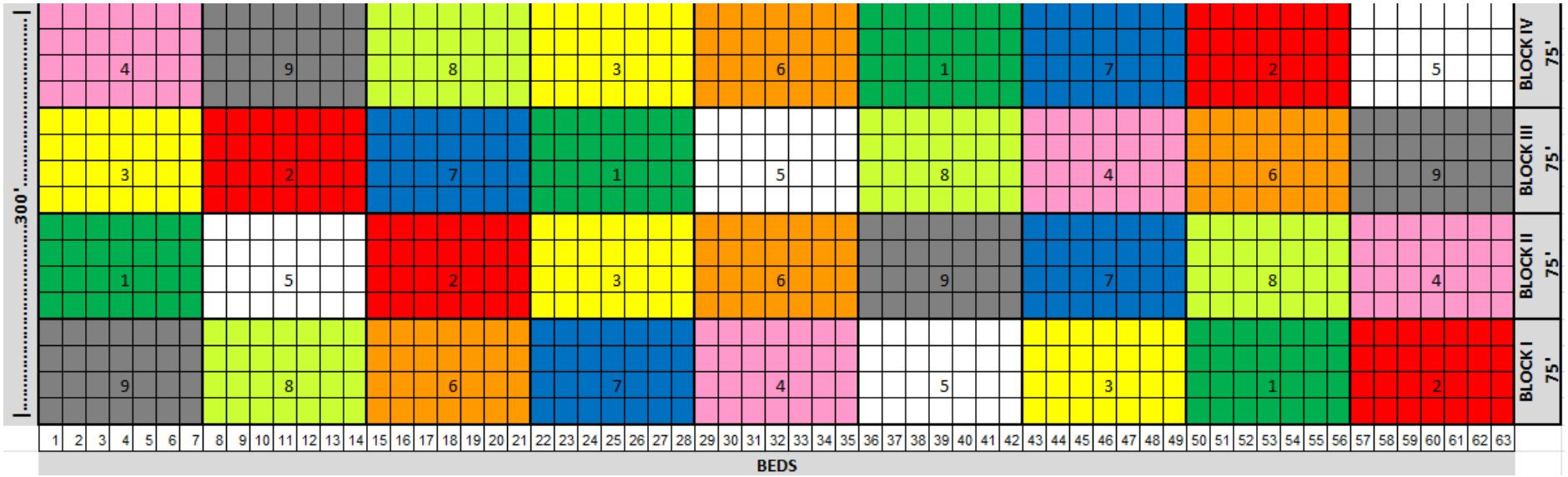
Strawberry-IPM trial 2012



Treatments:

1. Untreated control
2. Assail 70 WP (acetamiprid) 3 oz/ac in 50 gal
3. BotaniGard WP (*Beauveria bassiana)* 2lb/ac in 50 gal
4. BotaniGard WP 2lb/ac + Molt-X (azadirachtin) 8 fl oz/ac in 50 gal
5. BotaniGard WP 2lb/ac + Danitol (fenpropathrin) ½ label rate 5.3 fl oz/ac in 50 gal
6. BotaniGard WP 2lb/ac + Assail ½ label rate 1.5 oz/ac in 50 gal
7. AzaGuard (azadirachtin) 8 fl oz/ac in 50 gal
8. AzaGuard 16 fl oz/ac in 50 gal
9. Rimon 0.83 EC (novaluran) 12 fl oz/ac + Brigade (bifenthrin) 16 oz/ac in 50 gal

Experimental period: July-August, 2012

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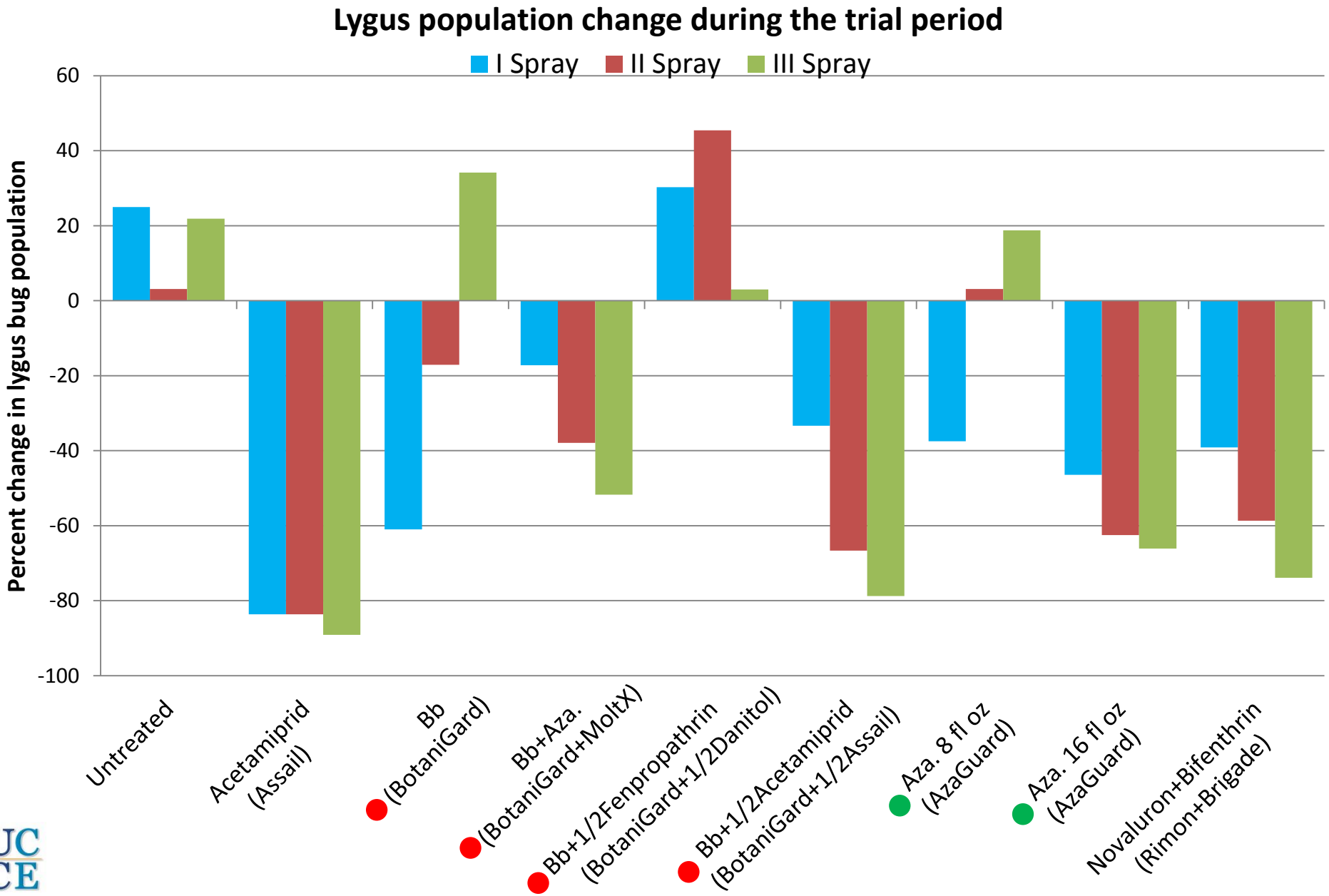
Strawberry-IPM trial 2012 – Lygus bug



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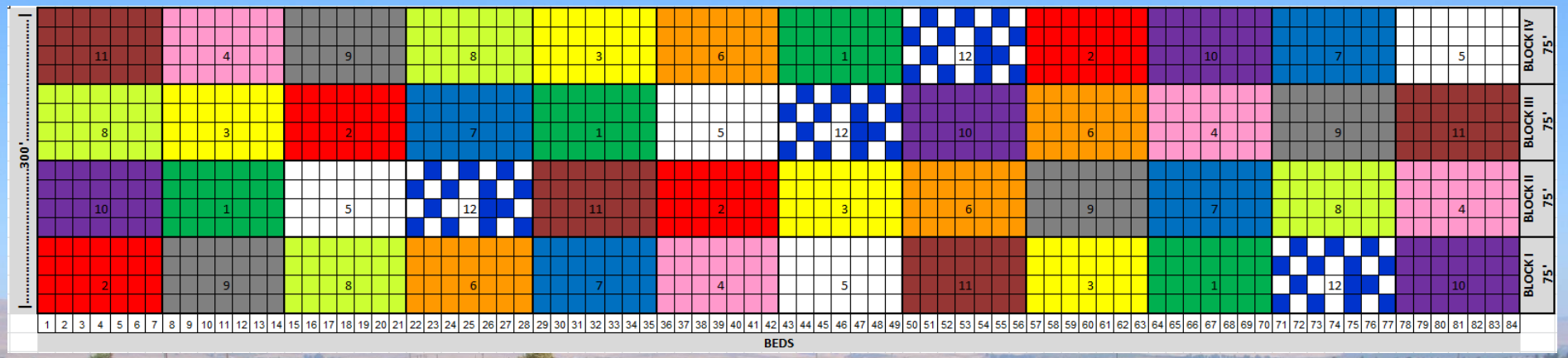
Strawberry-IPM trial 2013



Strawberry-IPM trial 2013

	1st application (Rate/acre)	2nd application (Rate/acre)	3rd application (Rate/acre)
1	Untreated	Untreated	Untreated
2	Assail 70 WP (3 oz) **4A***	Assail 70 WP (3 oz) **4A**	Assail 70 WP (3 oz) **4A**
3	Beleaf 50 SG (2.8 oz) **9C**	Beleaf 50 SG (2.8 oz) **9C**	Athena (17 fl oz) **3A+6**
4	Athena (17 fl oz) **3A+6**	Athena (17 fl oz) **3A+6**	Beleaf 50 SG (2.8 oz) **9C**
5	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**	EverGreen (16 fl oz) **3A+POB**
6	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**	BotaniGard ES (2 qrt) + Molt-X (8 fl oz)	BotaniGard ES (2 qrt) + Molt-X (8 fl oz)
7	Grandevo (2 lb)	Grandevo (2 lb)	Grandevo (2 lb)
8	BotaniGard ES (2 qrt) + Molt-X (8 fl oz)	Grandevo (2 lb)	Beleaf 50 SG (2.8 oz) **9C**
9	EverGreen (16 fl oz) **3A+POB**	EverGreen (16 fl oz) **3A+POB**	Assail 70 WP (3 oz) **4A**
10	BotaniGard ES (2 qrt) + Low Assail (1.5 oz) **4A**	BotaniGard ES (2 qrt) + Low Beleaf 50 SG (1.4 oz) **9C**	BotaniGard ES (2 qrt) + Low Athena (10 fl oz) **3A+6**
11	Closer (4.5 oz) **4C**	Closer (4.5 oz) **4C**	BotaniGard ES (2 qrt) + Grandevo (2 lb)
12	Closer (3 oz) **4C**	Closer (3 oz) **4C**	Beleaf 50 SG (2.8 oz) **9C**

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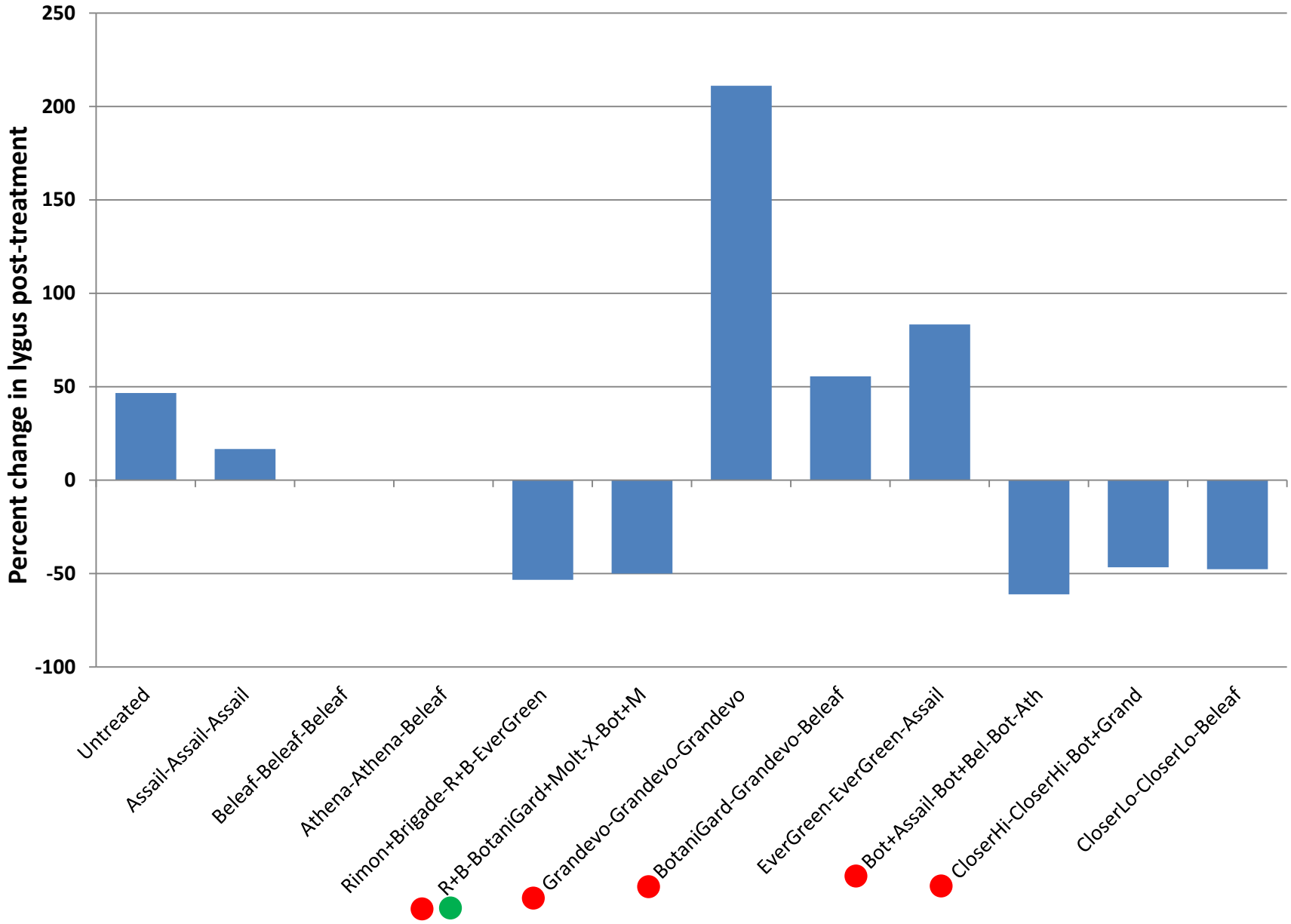
*MoA group

3A Pyrethrins
4A Neonicotinoids
4C Sulfoximines
6 Chloride channel activators
9C Selective homopteran feeding blockers
15 Inhibitors of chitin biosynthesis

Strawberry-IPM trial 2013 – Lygus bug

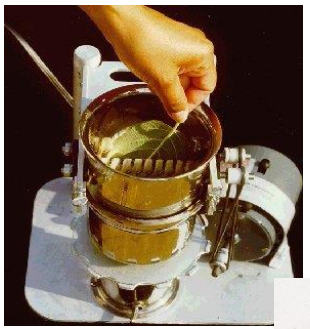


Strawberry-Miticide trial 2013

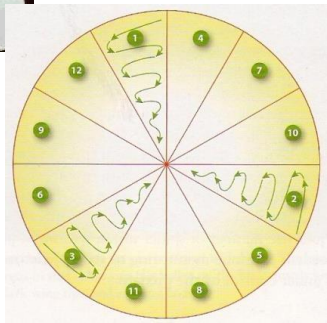
Treatments

1. Untreated
2. Acramite 50 WS (bifenazate) 1 lb
3. Agri-Mek SC (abamectin) 4.29 fl oz
4. BotaniGard ES (*B. bassiana*) 1qrt + Acramite 0.75 lb
5. Eco-Mite 1% (rosemary and cotton seed oils)
6. Fujimite 5 EC (fenpyroximate) 2 pt
7. Fujimite XLO 2 pt
8. Grandevo *(C. subtsugae)* 2 lb
9. Venerate (MBI206) 2 gal
10. Nealta (cyflumetofen) 13.7 fl oz

Spraying 150 gal/acre at 70 psi with hollow cone nozzle



Plot size 14’ longX44” wide bed replicated 4 times



Treated on May 16 and 25, 2013

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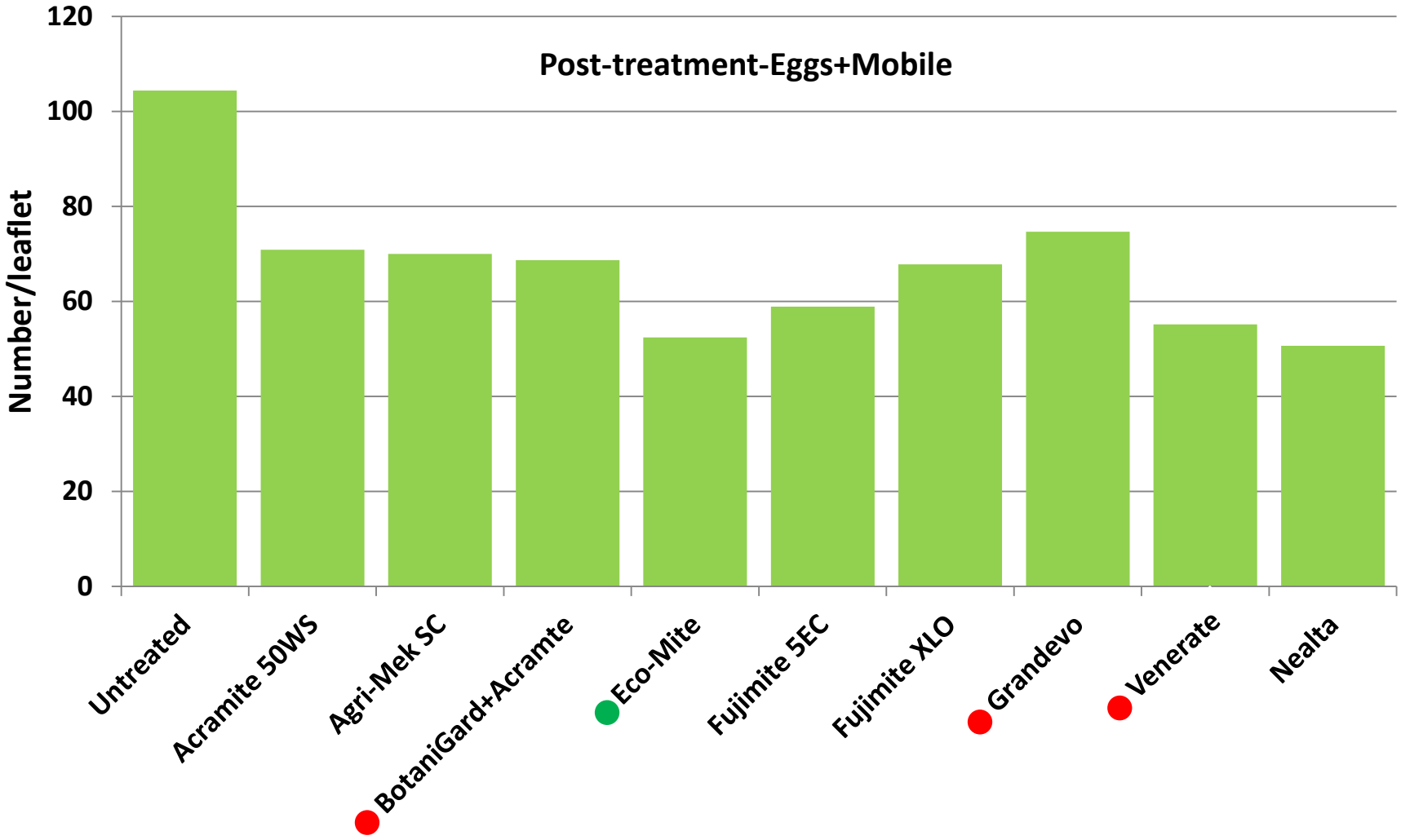
Strawberry-Miticide trial 2013



Broccoli Aphid Trial 2012

Treatments

1. Untreated control
2. Assail 30 SC (acetamiprid) 4 oz
   + DyneAmic (NIS) 0.1% v/v
3. BotaniGard 22 WP (*Beauveria bassiana*) 2 lb
   + DyneAmic 0.125%
4. Torac 15 EC (tolfenpyrad) 21 fl oz
   + DyneAmic 0.25%
5. Pyrifluquinazon 3.2 fl oz + DyneAmic 0.25%
6. NNI-1171 21 fl oz (new ai) + DyneAmic 0.25%
7. Closer (sulfoxaflor) 1.5 fl oz + DyneAmic 0.25%
8. Closer 2.0 fl oz + 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 20’ long bed replicated 4 times

Planted on July 31, 2012

Treated on September 5 and 25, 2012

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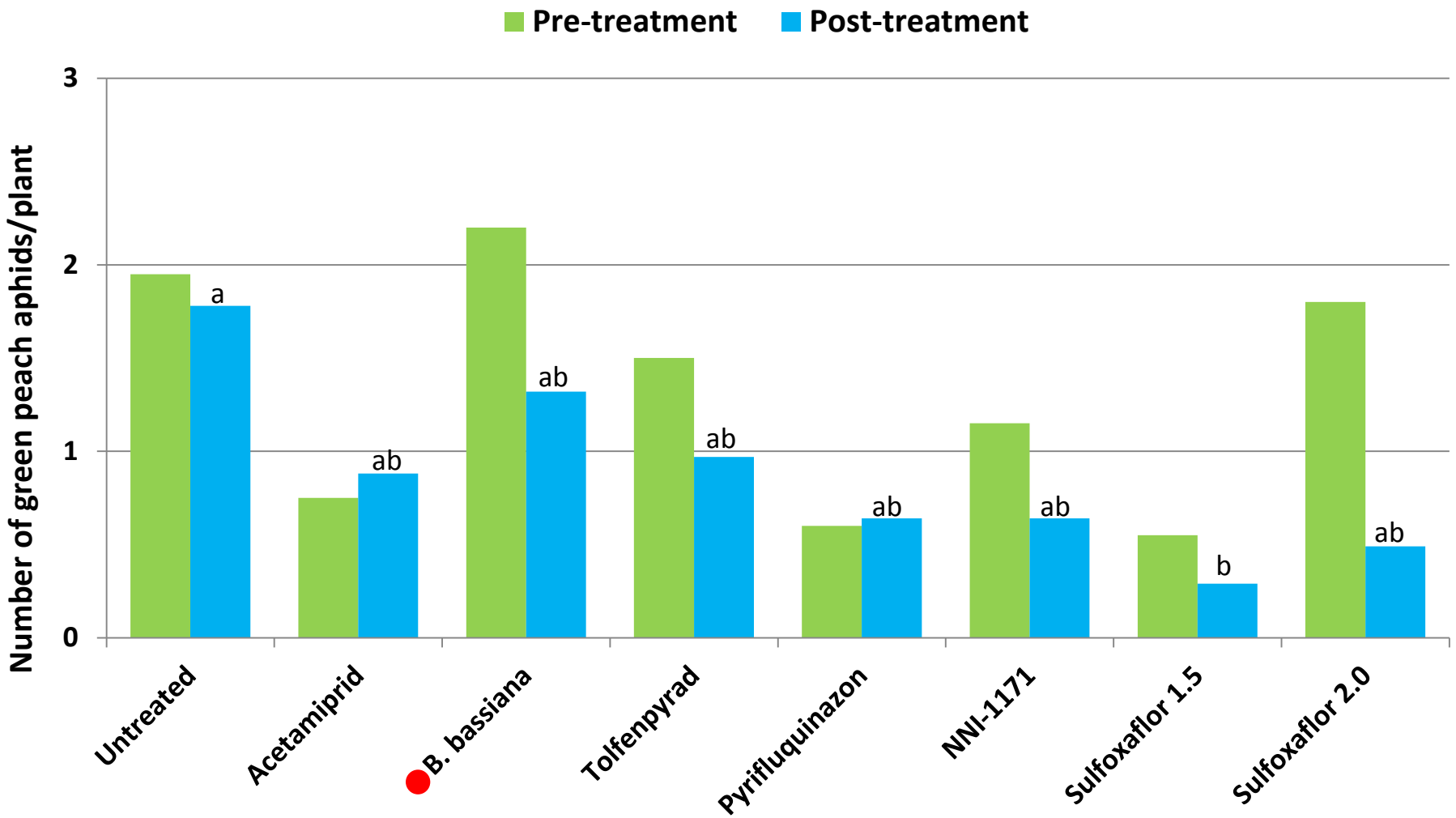
Green peach aphids before and after spray applications



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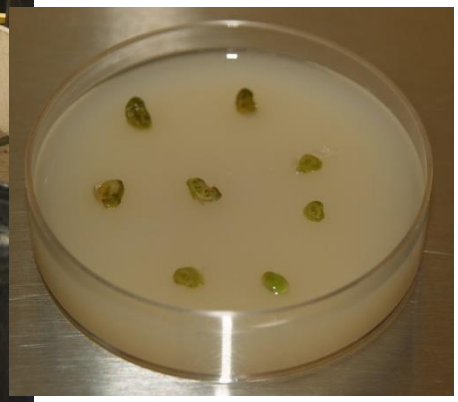
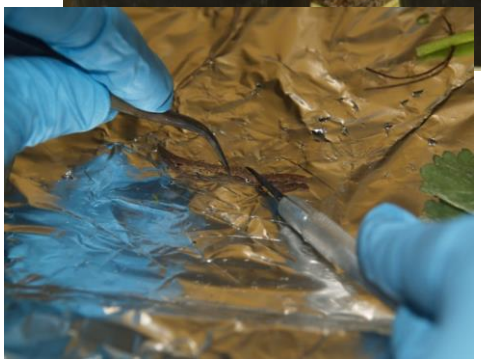
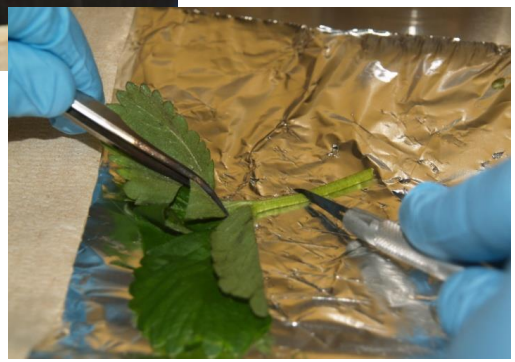
Endophytic colonization of strawberry plants

- Rinsed, surface-sterilized and rinsed the plant material
- Plated plant tissue on selective medium
- Plated rinsate on medium to verify contamination







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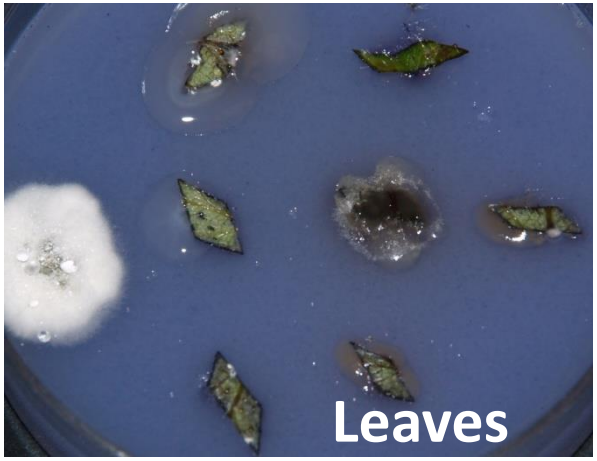
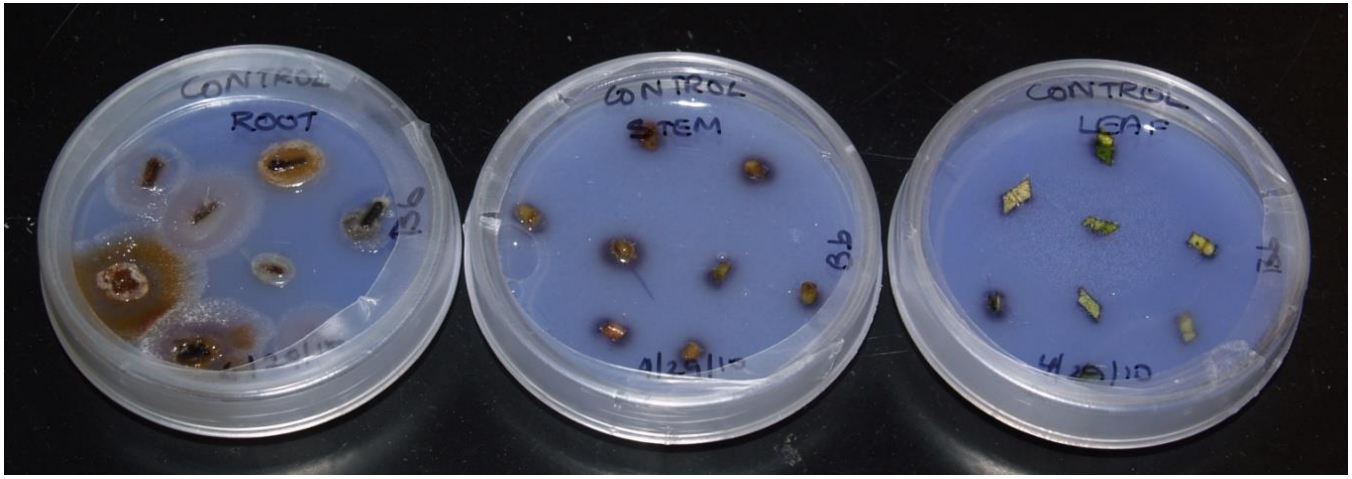
Endophytic colonization of strawberry plants



Emergence of colonized *B. bassiana* from treated plant tissue



No *B. bassiana* detected in controls

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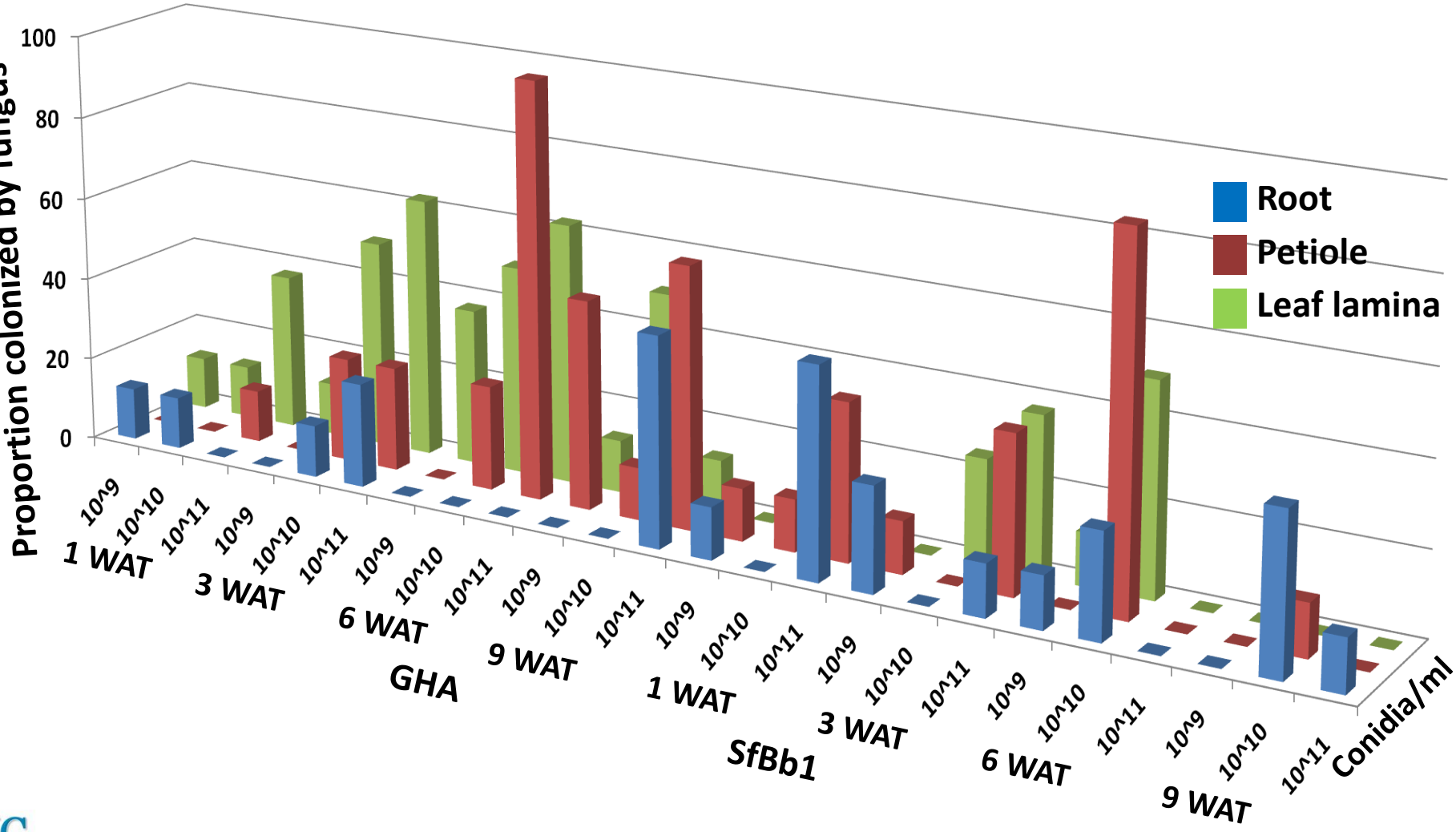
Endophytic colonization of strawberry plants



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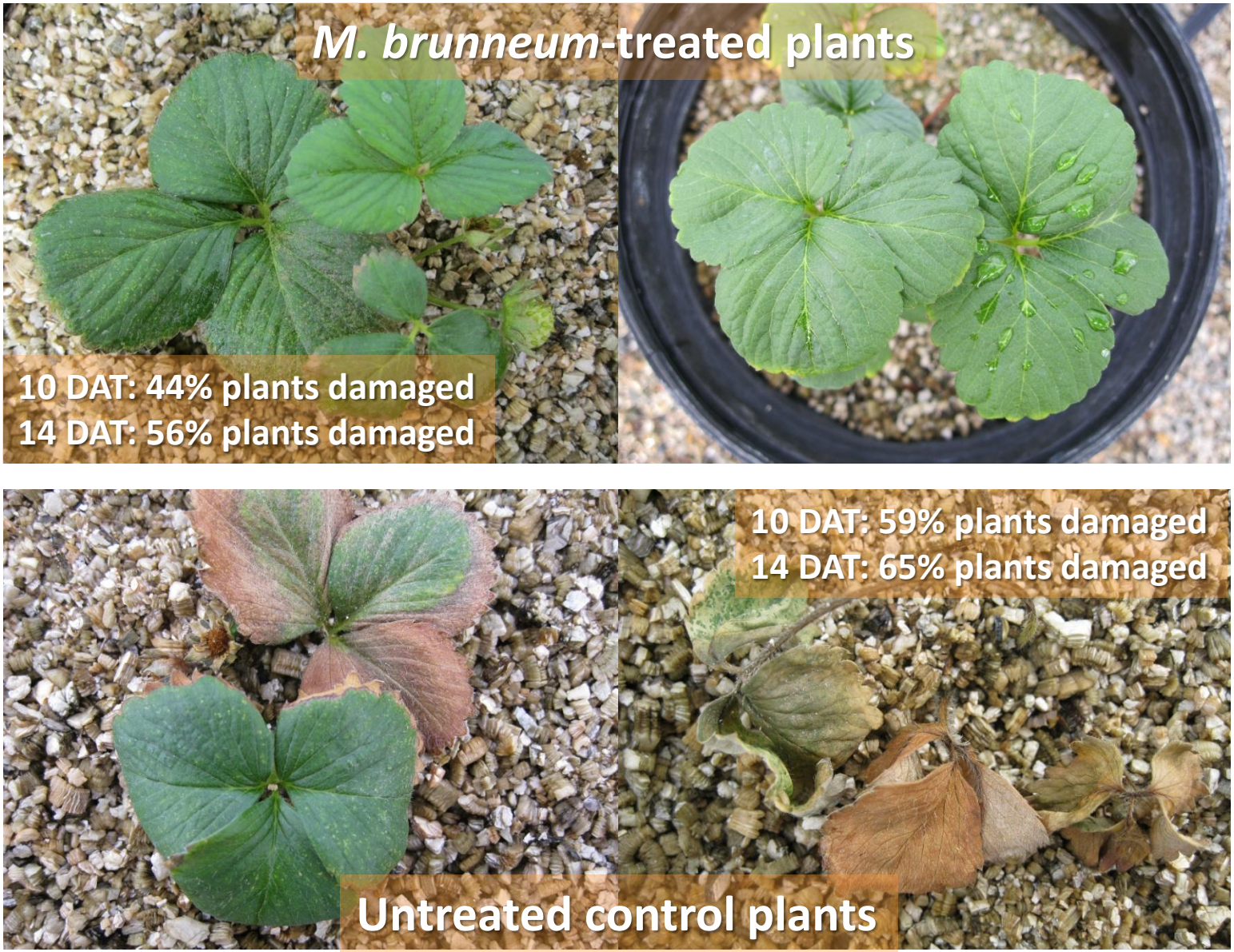
Endophytic colonization by *M. brunneum*



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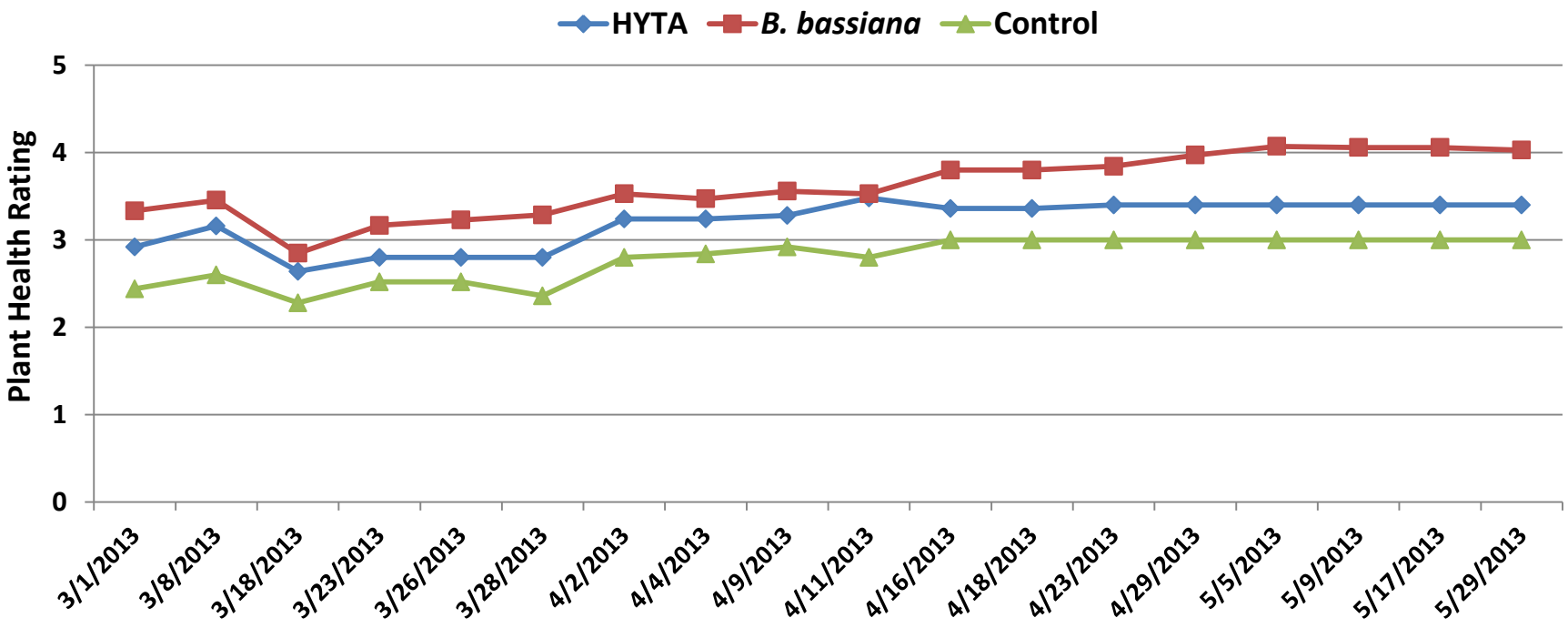
Entomopathogenic fungi in a new role



0 1 2-3 4 5

Mycotrol-O: *Beauveria bassiana* **3.6**

HYT A: Microbial plant growth enhancer **3.2**

Untreated control **2.8**

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Entomopathogenic fungi

- Can play an important role in strawberry and vegetable pest management
- Promote plant growth and health

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Greenhouse strawberry production

Greenhouse strawberry production

Greenhouse strawberry production

Greenhouse strawberry production

Greenhouse strawberry production

Greenhouse strawberry production

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Greenhouse strawberry production

Field strawberry production

Field strawberry production

Strawberry transplant production

Field strawberry production

Invasive and endemic pests and diseases

University of California
Strawberries and Vegetables

Bagrada bug

1. Bagrada bug: An exotic pest in southern California — January 13, 2011
2. Bagrada bug is now in Santa Barbara County — September 7, 2012
3. Update on the Bagrada bug as it moves up to San Luis Obispo County — October 4, 2012
4. An update on the Bagrada bug — March 15, 2013
5. Bagrada bug host preference: Crucifers and green beans — March 26, 2013
6. Bagrada bug update: bioassays and a short video — August 1, 2013

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Invasive and endemic pests and diseases

University of California
Strawberries and Vegetables

Pallidosis disease

1. Whiteflies becoming a concern for the strawberry growers — January 30, 2013
2. Possible pallidosis-related decline of strawberries in Santa Maria — May 31, 2013
3. Viral disease pallidosis-related decline confirmed in strawberries — July 2, 2013
4. Increased whitefly risk to strawberries as a pest and a vector of the viral disease, pallidosis-related decline — July 9, 2013
5. Update on strawberry pallidosis-related decline and a short video — September 23, 2013

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Invasive and endemic pests and diseases

Bagrada Bug-Biology, Damage, and Control

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691 views

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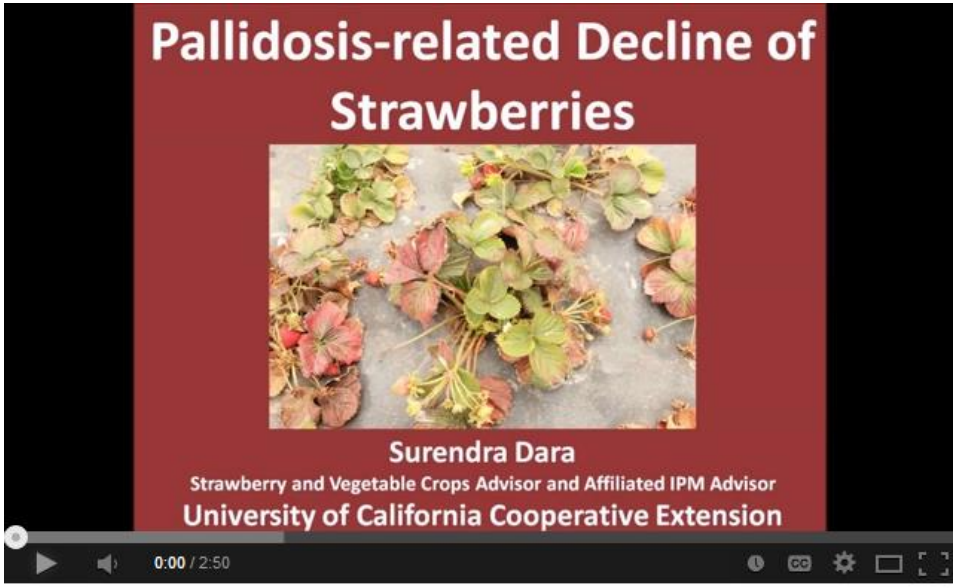

Pallidosis-related decline of strawberries

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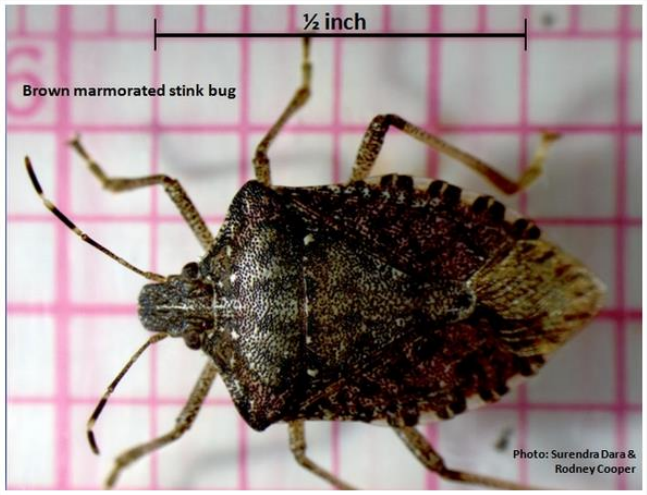
Invasive and endemic pests and diseases

Brown Marmorated Stink Bug in San Luis Obispo County

Posted By: **Surendra Dara** November 3, 2011
Written by: Surendra Dara



Asian Citrus Psyllid in Santa Maria

Author: **Surendra Dara** November 7, 2012

PEST NEWS

Information about pests

Weeping fig thrips, Gynaikothrips uzeli found in California

Author: **Surendra Dara** March 24, 2014

Adult weeping fig thrips, larva, and eggs. (Photo by Gevork Arakelian, Senior Biologist, Los Angeles County)

Thank you!

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