University of California
Agriculture and Natural Resources

Managing Downy Mildew in Beets and Aphids in Celery

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Downy mildew in beets

- Caused by *Peronospora farinosa*
- Light green spots on the upper leaf surface
- White to grey fungal growth
- Wilting and death of leaves in severe cases
- Crown infection can lead to excessive foliage and misshapen bulbs

Jom Correll, U of Arkansas

Downy mildew on spinach - Photo: Steve Koike

www.shouragroup.com

Treatments

I Spray		II Spray		III Spray	
Product	**Rate**	**Product**	**Rate**	**Product**	**Rate**
Untreated		Untreated		Untreated	
Reason 500 SC	8.2 fl oz	Reason 500 SC	8.2 fl oz	Reason 500 SC	8.2 fl oz
Oxidate 2.0	0.5 gpa	Trilogy	1 gpa	Cueva	1 gpa
OR009	48 fl oz	OR009	48 fl oz	OR009	48 fl oz
Reason+OR009	5.5 fl oz+32 fl oz	Reason+OR009	5.5 fl oz+32 fl oz	Reason+OR009	5.5 fl oz+32 fl oz
OxiDate+OR097	0.5 gal+32 fl oz	Trilogy+OR097	1 gal+32 fl oz	Cueva+OR097	1 gal +32 fl oz

Trade name	**Active ingredient(s)**
Cueva	Copper octanoate
Reason 500 SC	Fenamidone
OxiDate 2.0	Hydrogen dioxide + Peroxyacetic acid
Trilogy	Neem oil
OR009	Alcohol ethoxylate
OR097	Alcohol ethoxylate

Experimental design

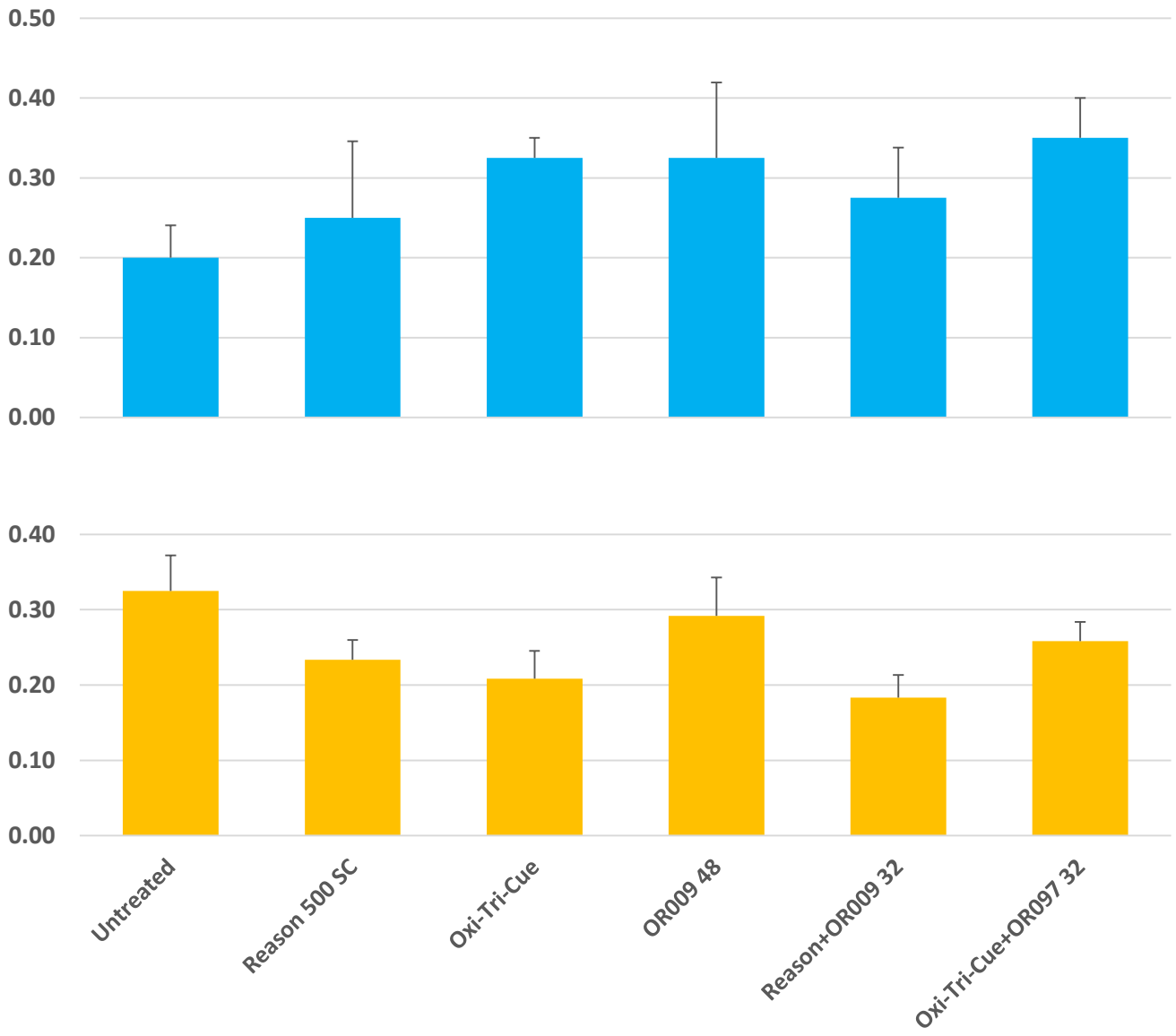
- Randomized complete block design
- Four replications
- Plot size 15’X62”
- 100 gpa spray volume
- 0.0125% Dyne-Amic
- Applied with backpack sprayer
- Treated on 5/13, 5/26, and 6/4/2015

Downy mildew severity before and after treatment

Severity Rating
1 = 1-24%
2 = 25-50%
3 = 51-75%
4 = 76-100%

Pre-treatment

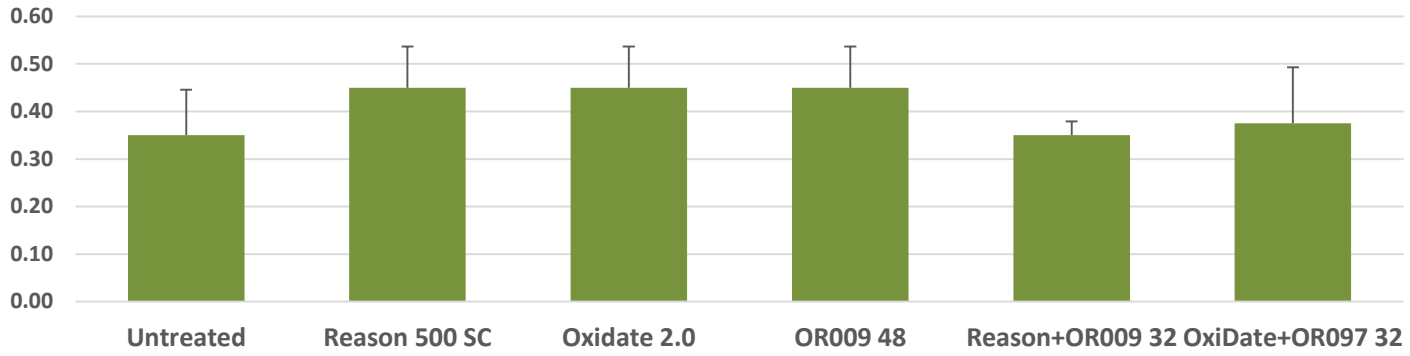
Post-treatment



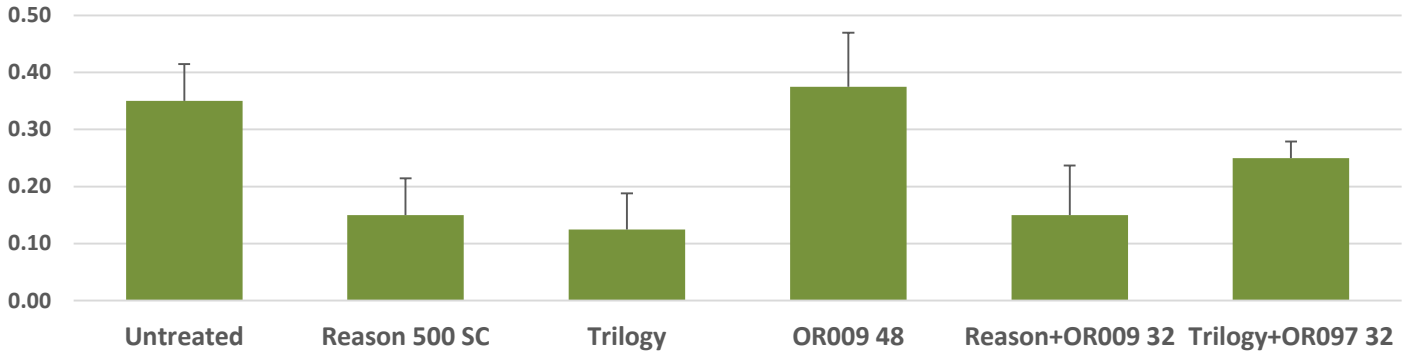
P > 0.05

Downy mildew severity after each application

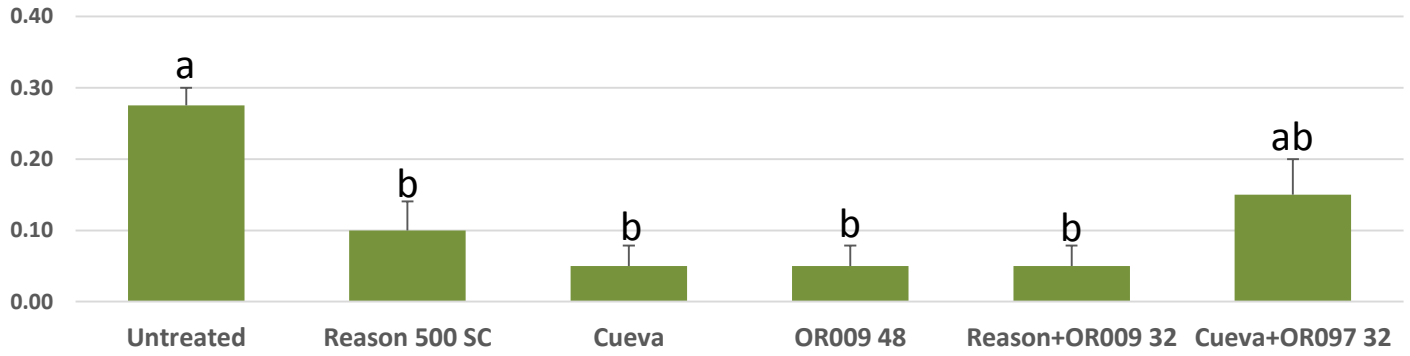
1st Spray



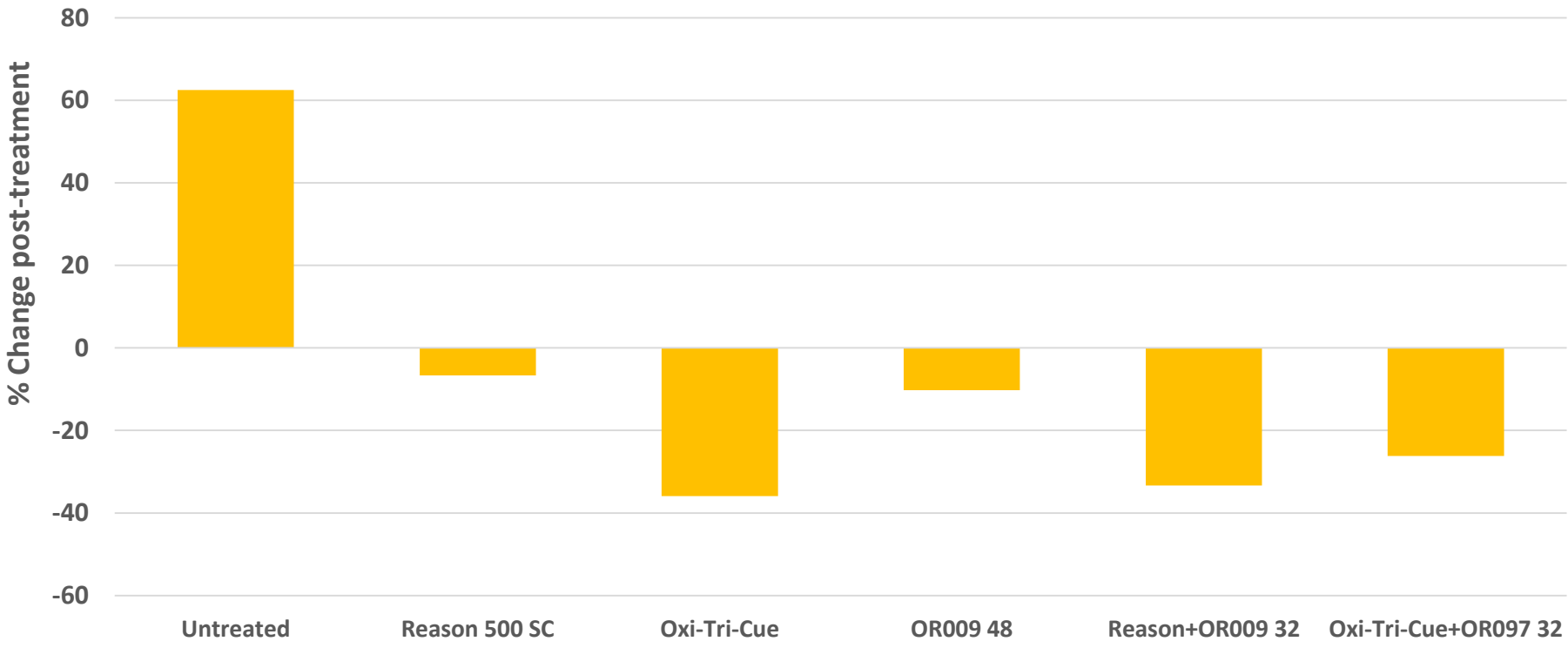
2nd Spray



3rd Spray



Percent change in downy mildew severity



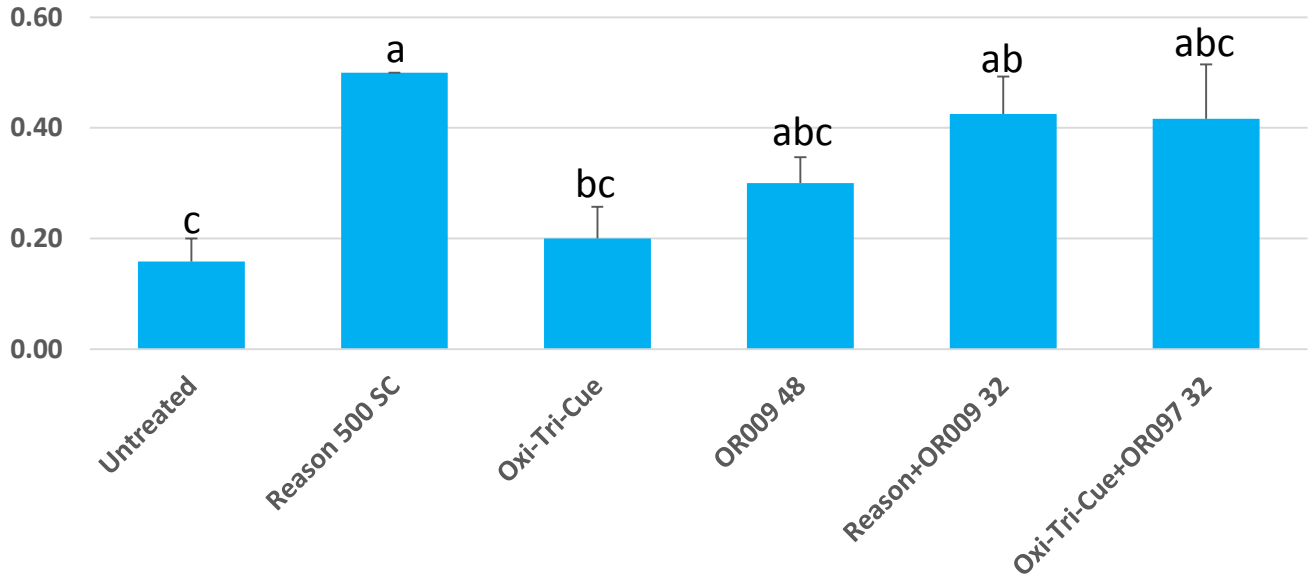
Phytotoxicity?

Phytotoxicity severity before and after treatment

Severity Rating
1 = 1-24%
2 = 25-50%
3 = 51-75%
4 = 76-100%

No pre-treatment phytotoxicity

Post-treatment



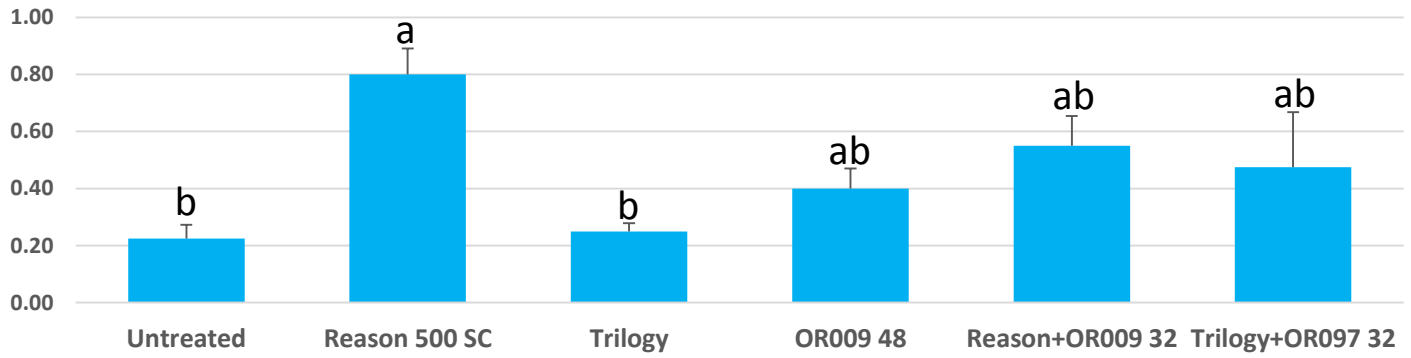
P = 0.002

Phytotoxicity after each application

1st Spray

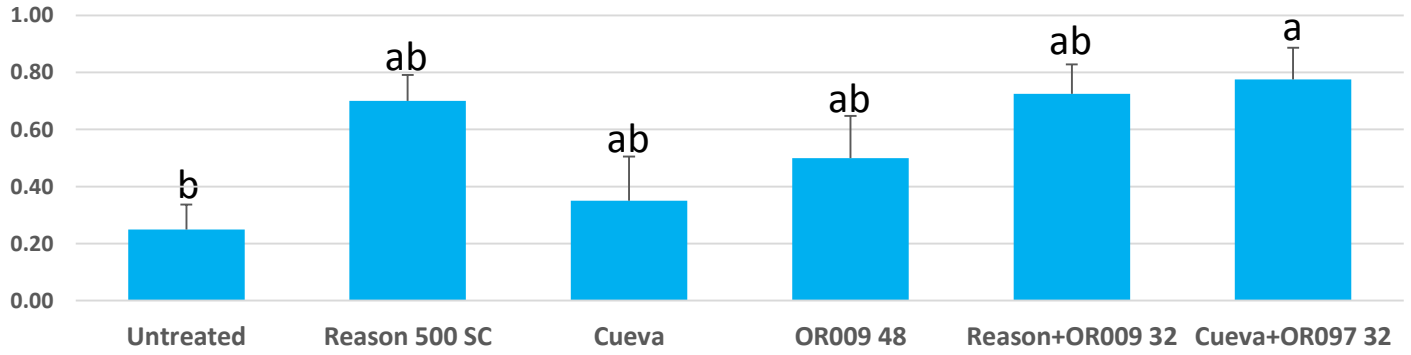
No phytotoxicity after 1st spray

2nd Spray



P = 0.012

3rd Spray



P = 0.013

Conclusion

- OxiDate-Trilogy-Cueva rotation alone and with OroBoost at 32 fl oz and Reason with OR009 at 32 fl oz caused relatively higher reduction

Aphids in organic celery

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Aphids in organic celery

Rice root aphid, *Rhopalosiphum rufiabdominale*

Photo by Brian Cabrera, SB Ag Commissioner's Office

Honeysuckle aphid, *Hyadaphis foeniculi*

Photo by A. Jensen, aphid.aphidnet.org

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Aphids in organic celery

Treatments

1. Untreated control

2. Ecotec (rosemary oil 10% and peppermint oil 2%) 19.2 fl oz + Kinetic (silicone and non-ionic surfactants) 12 fl oz

3. AzaGuard (azadirachtin) 6.3 fl oz + OroBoost (alcohol ethoxylate) 20 fl oz

4. Mycotrol-O (*Beauveria bassiana*) 1.5 qrt

5. Mycotrol-O 1.5 qrt + AzaGuard 6.3 fl oz

6. Venerate (*Burkholderia* spp.) 2 gal

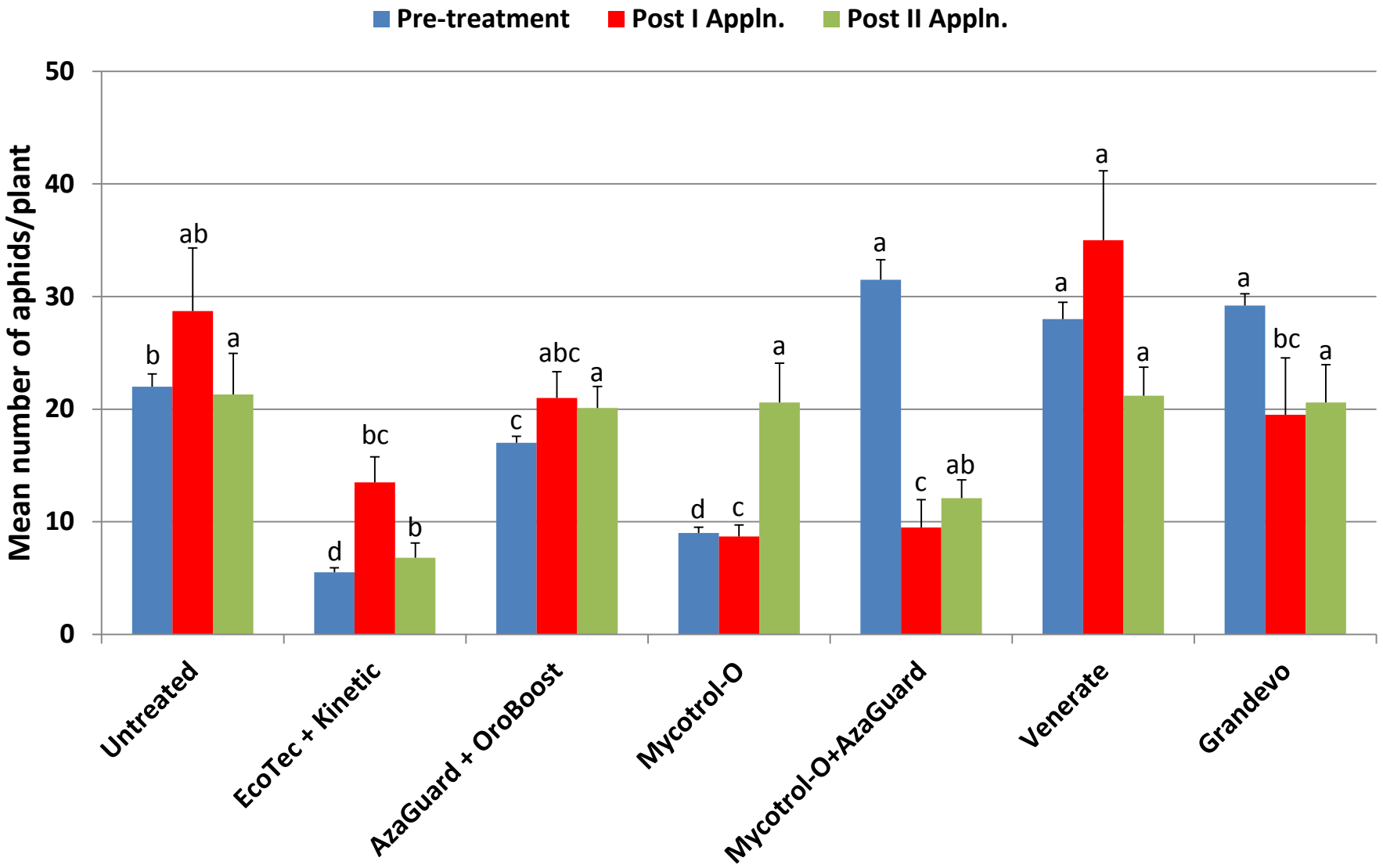
7. Grandevo *(Chromobacterium subtsugae)* 2 lb

Application Through drip (250 gal for 40-45 min)

Plot size 4 beds (0.3 acre)

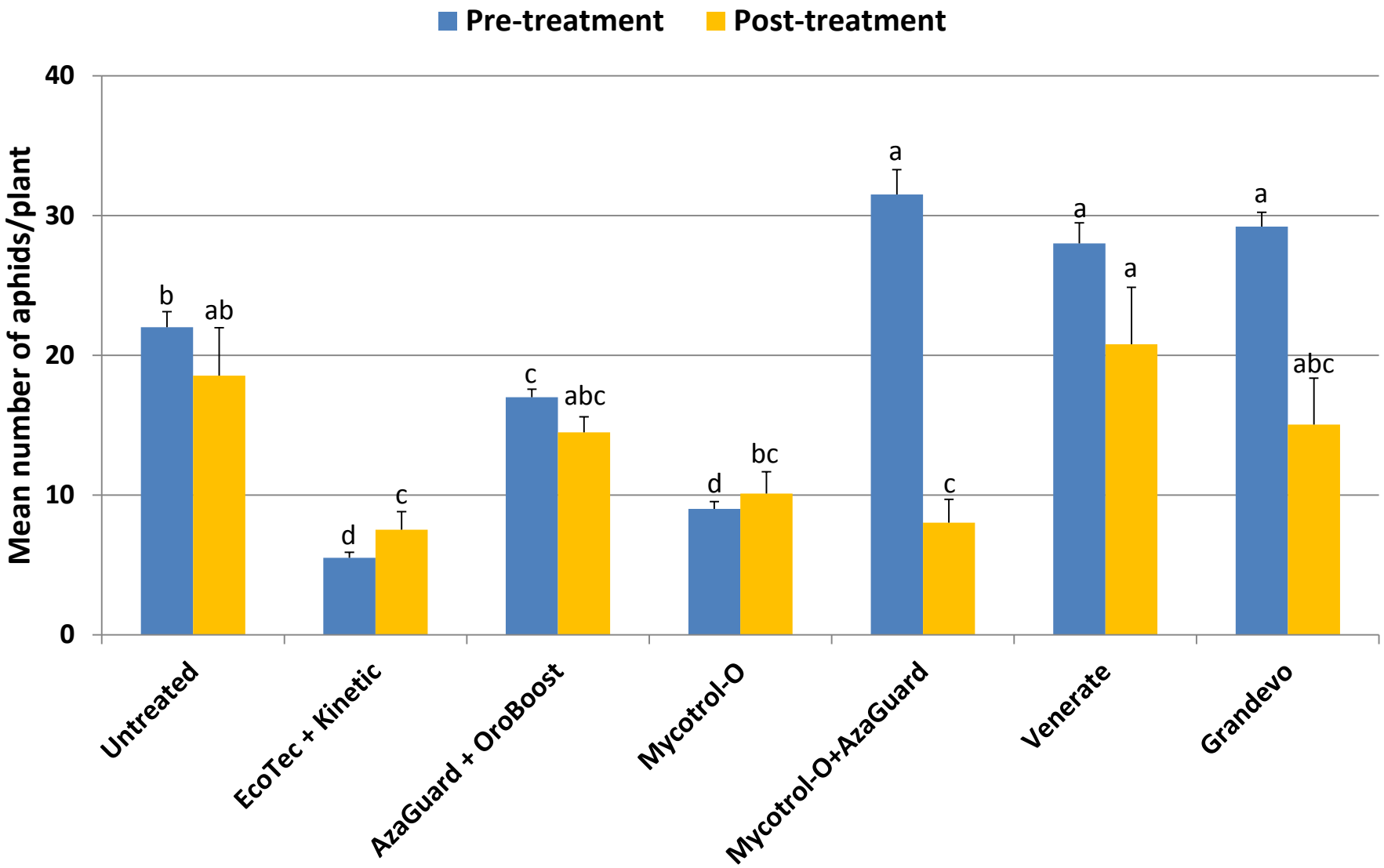
Treated on December 9 and 23, 2014

Aphids before and after each treatment



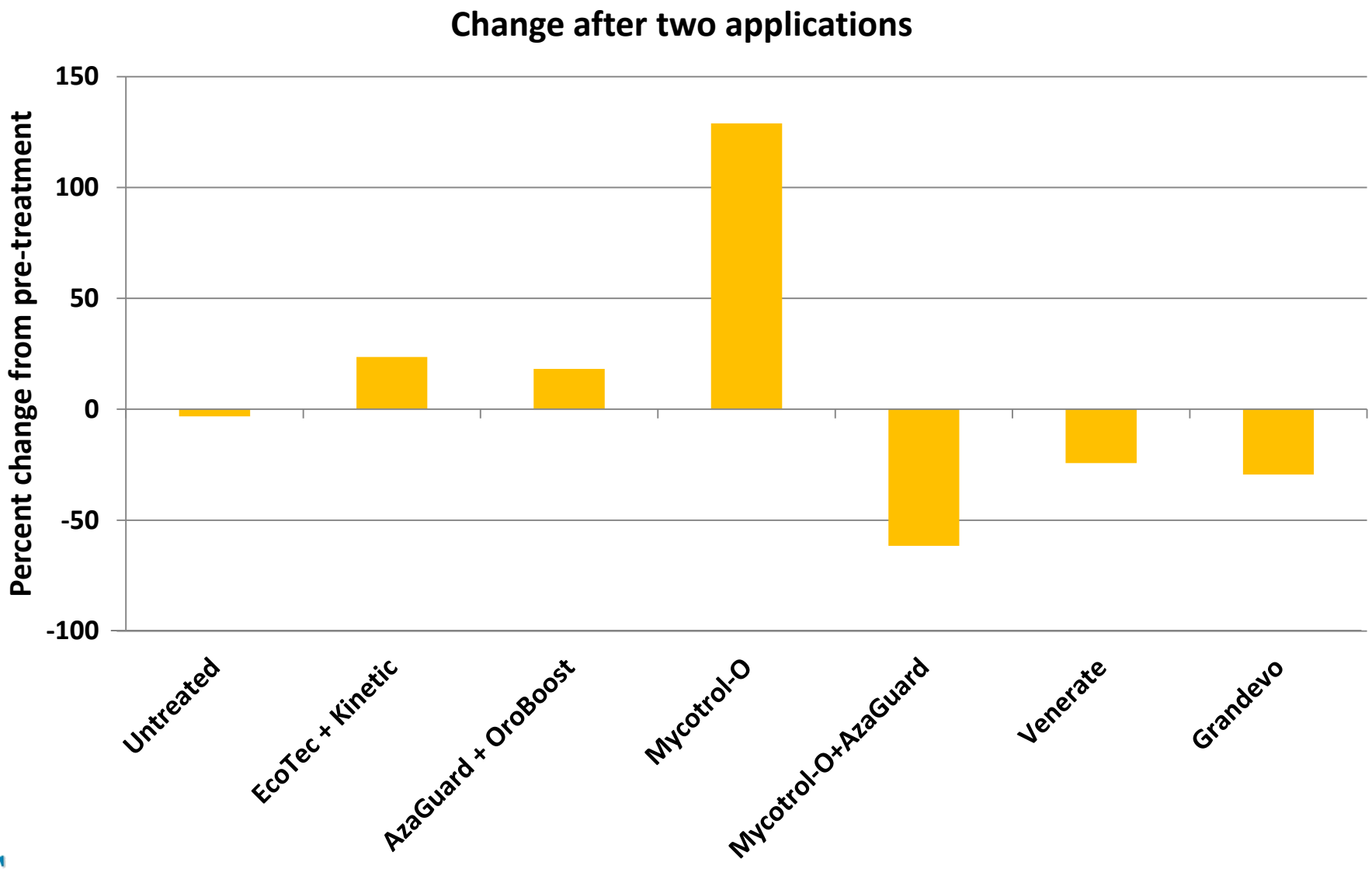
Tukey's HSD $P < 0.002$

Aphids before and after treatment



Tukey's HSD $P < 0.0001$

Percent change in aphid numbers



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Conclusions

- There are multiple organic tools for consideration
- Understanding their modes of action is important for using them effectively
- Certain combinations work better than individual products

Acknowledgments

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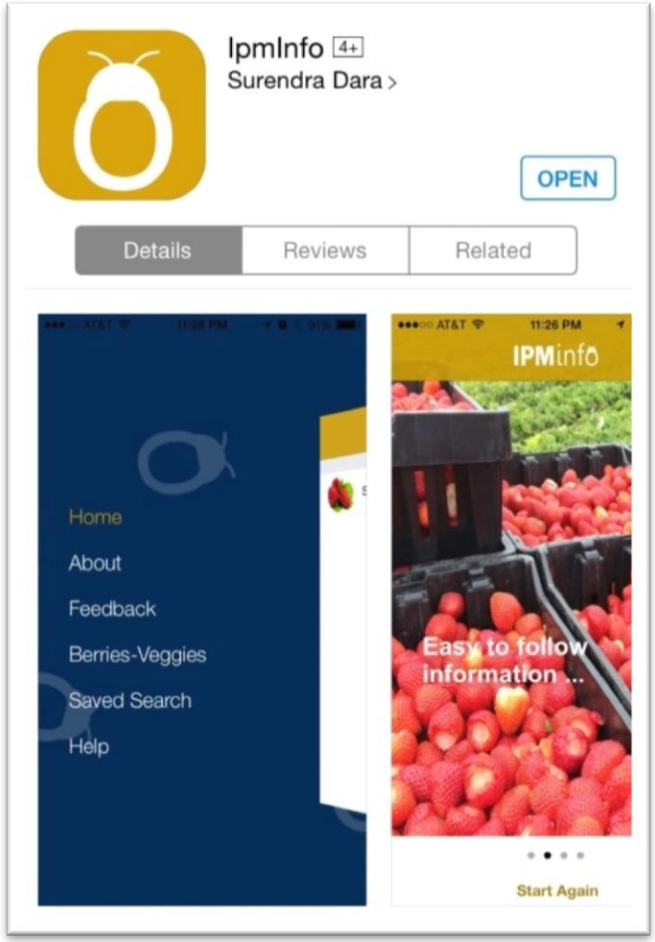

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