ASA California Plant and Soil Conference - 2018

Doubletree Hotel
Fresno, CA

Applied Advancements for Improving Yield and Quality of Tree fruit and Nut Crops

wesASAI
Pomology Consulting
Turlock, California

Managing Soil Applied Potassium on Low CEC Soils

The Impact of Early Bee Removal on Pollination and Yield of Almond

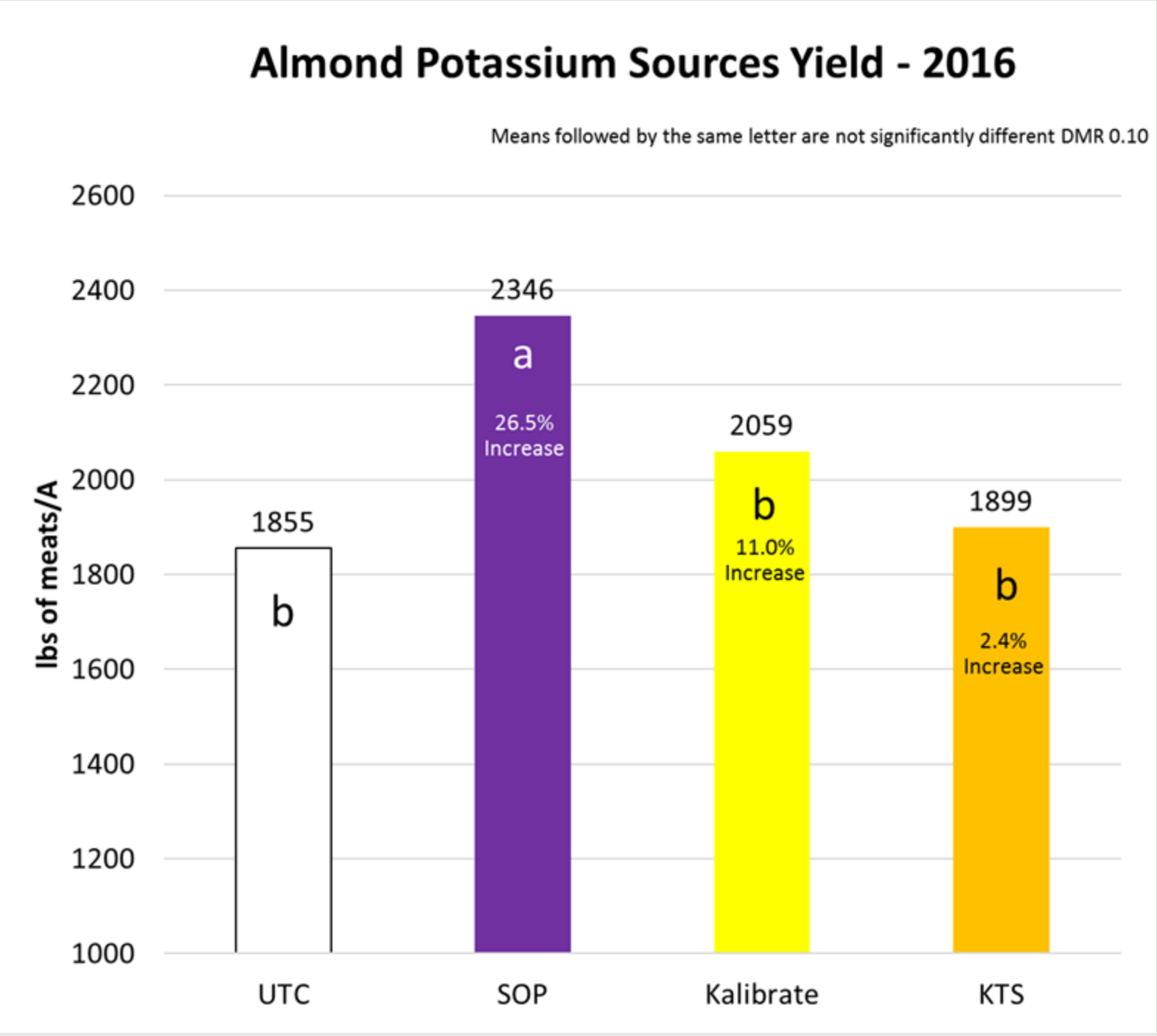
The Impacts on Pollination of Sprays Applied During Bloom

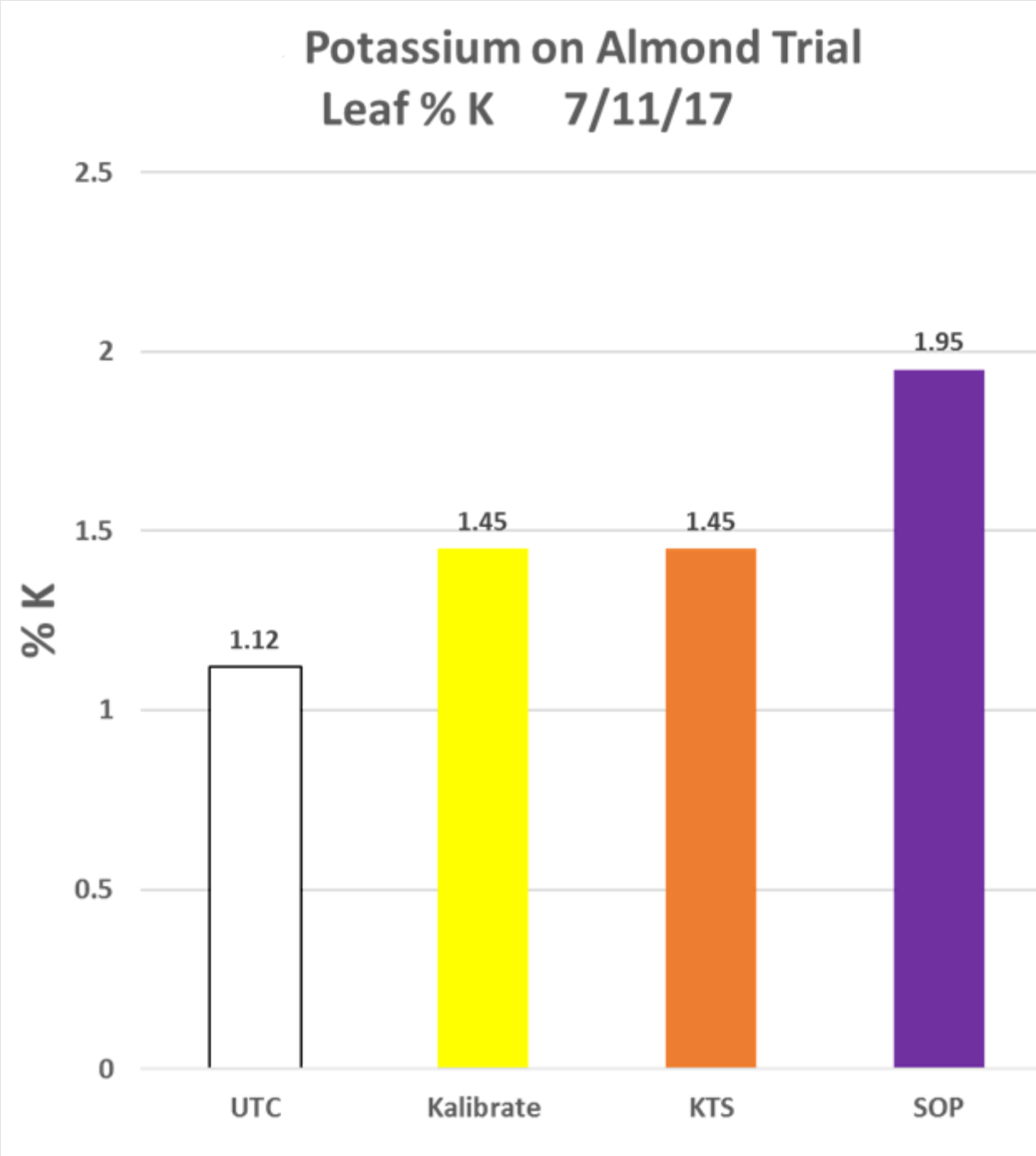
Untreated Check

SOP 450 lbs/A annually

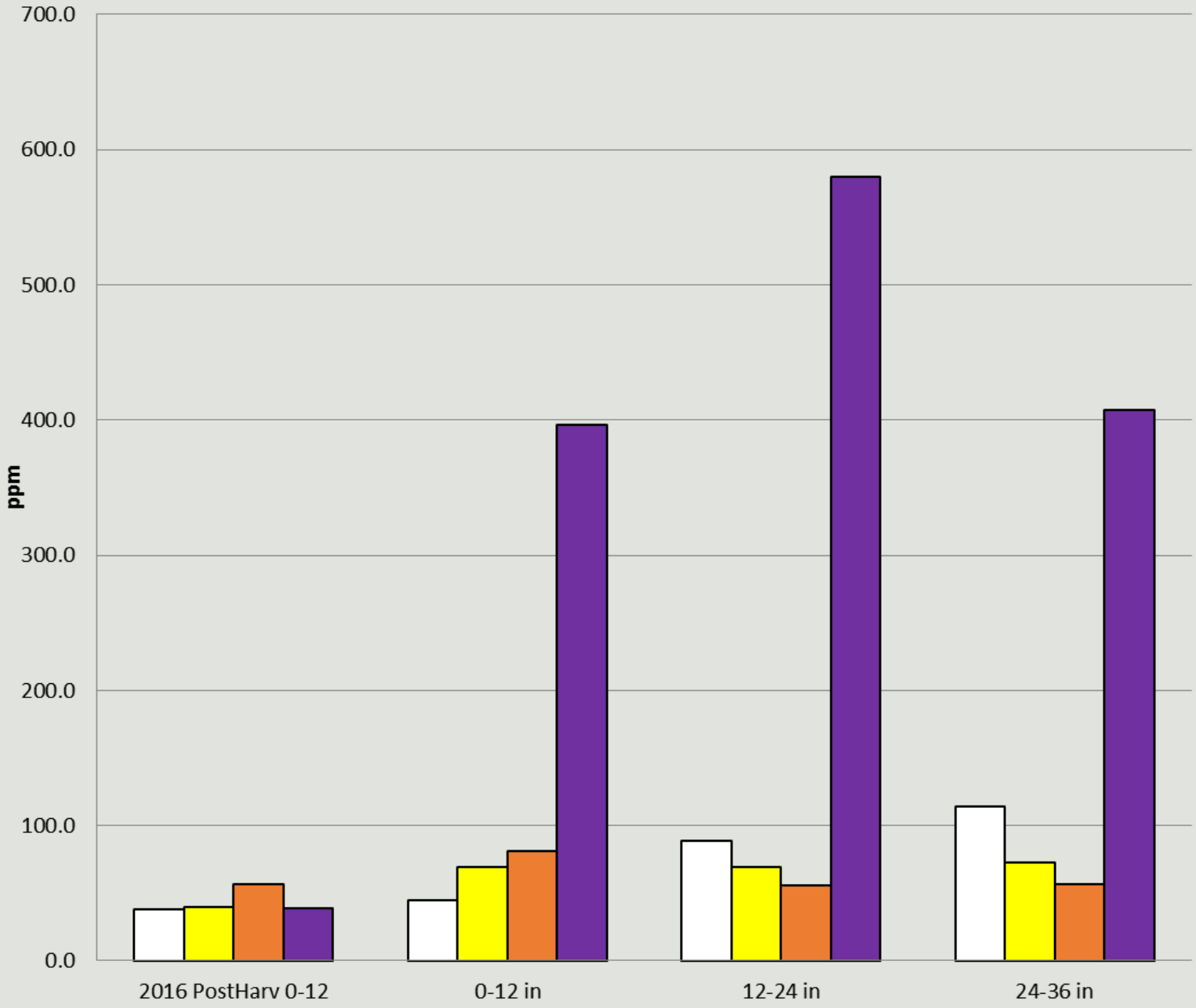
KTS 8 gal/A (Postharvest; Mar/Apr/May/Jun)

Kalibrate 3 gal/A (Postharvest; Mar/Apr/May/Jun)


Almond Potassium Sources Yield - 2016
Means followed by the same letter are not significantly different DMR 0.10
lbs of meats/A
2600
2400
2200
2000
1800
1600
1400
1200
1000
1855
b
2346
a
26.5% Increase
2059
b
11.0% Increase
1899
b
2.4% Increase
UTC
SOP
Kalibrate
KTS


Potassium on Almond Trial
Leaf % K 7/11/17
% K
2.5
2
1.5
1
0.5
0
1.12
1.45
1.45
1.95
UTC
Kalibrate
KTS
SOP

Soil K (ppm) / Treatment



REMOVING HONEY BEES FROM THE ORCHARD

University of California recommends bee removal when 90% of the flowers on the latest blooming variety are at petal fall.[9] Past this point, no pollination is taking place, and bees that forage outside the orchard (up to 4 miles), seeking alternate food sources and water, will have a higher risk of coming in contact with insecticide-treated crops.

After blossoms open, they release pollen for about four days. When temperatures are above 55°F, pollen is released when the anthers split open, or dehisce. This happens in progression over this period, with not all anthers opening at once. Typically, the pollen that is released each day is collected by bees by mid-afternoon. The pollen-receiving structure, the stigma surface, is receptive to fertilization for about five days after a blossom opens. However, fertilization is most successful when pollination occurs during the first few days that a flower is open.

Bees, both pollen and nectar collectors, concentrate on recently opened blooms. In one study, about 90% of all bee visitations were confined to flowers that have pollen. With adequate weather and bee activity, essentially all pollen will be collected from individual flowers within about four days after they have opened. Conforming to this, past work shows that during favorable pollination weather, almond flowers remain receptive to cross-pollination up to about four to five days after opening. Cooler weather, below 55–60°F, will lengthen the period of pollen collection and flower receptivity, and will delay petal fall.

Pollen-collecting bees land on the top of anthers and transfer pollen to the stigma surface, resulting in fertilization.

Both pollen and nectar collectors concentrate c

california almonds®
Almond Board of California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Counted Buds on 15 Butte and 15 Padre Trees

at 90% Petalfall (3/31/10)

Counted nut set (5/25/10)

Average Set on Butte = 56.4%

Average Set on Padre = 64.1%

Assumptions:

110 trees/A

Average production: 2400 lbs/A

Average Butte/Padre Count Per Ounce: 40

2400 lbs/A = 13,964 nuts per tree

Avg. % Set 35% = 39,897 blossoms per tree.

If bees removed after 90% bloom completed, there are still 3,990 blossoms potentially unpollinated.

If 60% of these set = 2394 extra nuts per tree = 263,340 nuts/A = 411 lbs/A

2017 Counted Buds on 23 Padre trees

at 90% Petalfall (3/14/17)

Counted nut set (5/9/17)

Average Set on Padre = 23.7%

Assumptions:

110 trees/A

Average production: 2400 lbs/A

Average Padre Count Per Ounce: 40
2400 lbs/A = 13,964 nuts per tree

Padre Bloom Avg. % Set 35% = 39,897 blossoms per tree.

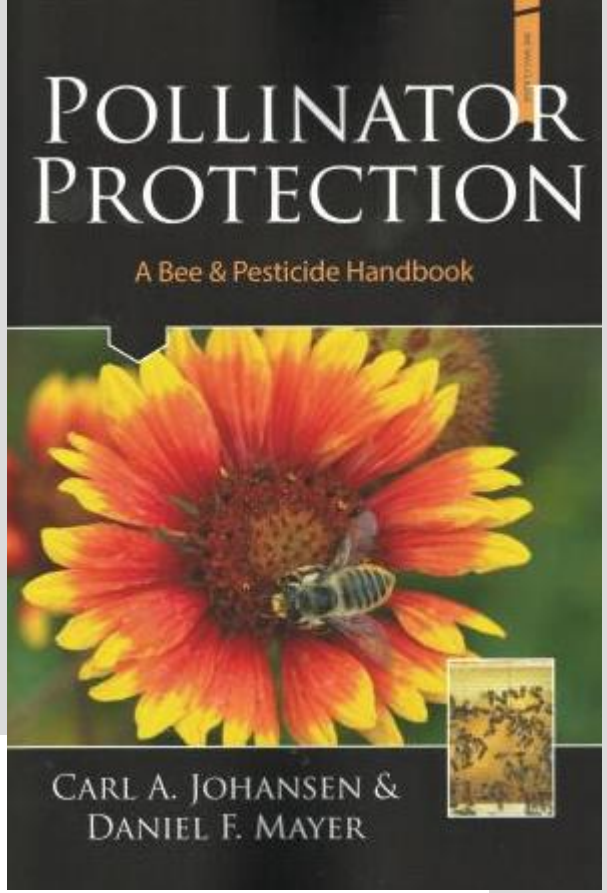
If bees removed after 90% bloom completed, there are still 3,990 blossoms potentially unpollinated.

If 23.7% of these set = 945 extra nuts per tree = 104,019 nuts/A = 163 lbs/A

Applying Sprays During Almond Bloom

Considerations:

- Bees
- Disease Management
- Nutrition
- Pollination and Phytotoxicity



SCIENTIFIC REPORTS

Altmetric: 275 Citations: 4 More detail »

Article | OPEN

An Inert Pesticide Adjuvant Synergizes Viral Pathogenicity and Mortality in Honey Bee Larvae

Julia D. Fine, Diana L. Cox-Foster & Christopher A. Mullin

Scientific Reports **7**, Article number: 40499 (2017)
doi:10.1038/srep40499
Download Citation
Ecology Immunology

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Pestic. Sci. 1993, **39**, 293–297

Synergism between EBI Fungicides and a Pyrethroid Insecticide in the Honeybee (*Apis mellifera*)

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(Revised manuscript received 21 June 1993; accepted 11 July 1993)

Abstract: The synergistic effect of a range of ergosterol-biosynthesis-inhibiting (EBI) fungicides and a pyrethroid insecticide was studied in the honeybee (*Apis mellifera* L.). Various EBI fungicides were combined separately with the pyrethroid lambda-cyhalothrin at ratios derived from their recommended application rates to represent tank-mixing in the field. The mixture was then applied topically to the thorax of honeybees, and mortality assessed 24 h post-treatment. All the fungicides tested increased the toxicity of lambda-cyhalothrin to honeybees. The fungicide

Direct
Indirect
Synergistic

Options:

Do not spray during bloom period.

Do not use materials with known toxicities to bees.

Spray when bees are not active (late in day or at night)

Efficacy and logistics.

ALMOND: TREATMENT TIMING

Note: Not all indicated timings may be necessary for disease control.

Disease	Dormant	Bloom			Spring[1]		Summer	
		Pink bud	Full bloom	Petal fall	2 weeks	5 weeks	May	June
Alternaria	----	----	----	----	----	++	+++	+++
Anthracnose[2]	----	++	+++	+++	+++	+++	+++	++
Bacterial spot	+	`---	+	++	+++	+++	+	`----
Brown rot	----	++	+++	+	----	----	----	----
Green fruit rot	----	----	+++	++	----	----	----	----
Hull rot[7]	----	----	----	----	----	----	----	+++
Leaf blight	----	----	+++	++	+	----	----	----
Scab[3]	++	---	---	++	+++	+++	+	---
Shot hole[4]	+[5]	+	++	+++	+++	++	----	----
Rust	----	----	----	----	----	+++	+++	+[6]

Rating: +++ = most effective, ++ = moderately effective, + = least effective, and ---- = ineffective

University of California
Pest Management Guidelines

Other Considerations: Bacterial Infections

The Influence of Spray Adjuvants on Exacerbation of Citrus Bacterial Spot

T. R. Gottwald, Research Plant Pathologist, USDA, Agricultural Research Service, Orlando, FL 32803; **J. H. Graham,** Professor, IFAS, CREC, University of Florida, Lake Alfred 33850; and **T. D. Riley,** Plant Pathologist, USDA, Agricultural Research Service, Orlando, FL 32803

ABSTRACT

Gottwald, T. R., Graham, J. H., and Riley, T. D. 1997. The influence of spray adjuvants on exacerbation of citrus bacterial spot. Plant Dis. 81:1305-1310.

The effect of adjuvants on the spread of *Xanthomonas axonopodis* pv. *citrumelo* applied to nursery plots of citrus (*Citrus* spp.) rootstock trees in simulated wind-blown rain was studied. Commercial adjuvants tested included a penetrant-surfactant, the penetrant or surfactant components of the penetrant-surfactant alone, an antitranspirant, a surfactant, or 1 of 3 formulations of a spreader-binder. Individual rows were treated with the adjuvants or water alone as a control. Bacterial dispersal gradients in all rows were similar and extended the entire 7 m of the nursery rows. Disease incidence, number of lesions per plant, and lesion diameters were determined at selected assay points in each row 28 days after the event. The penetrant-surfactant and its surfactant component significantly increased the total number of lesions per plant and mean lesion diameters compared to the water control. The disease gradient slopes associated with the penetrant-surfactant and its surfactant component were significantly flatter and more extensive than the water control. The penetrant component of the penetrant-surfactant, the antitranspirant, and two spreader-binders adjuvants did not significantly alter the disease gradient compared to the water control. Lesion sizes and numbers were also increased by a surfactant product and the surfactant component of the penetrant-surfactant, but not by the penetrant component of the penetrant-surfactant, the antitranspirant, or the three spreader-binder formulations. These results suggest that surfactants which induce stomatal flooding may enhance infection and exacerbate citrus bacterial epidemics.

X. axonopodis pv. *citrumelo* is most often spread mechanically by horticultural operations such as budding, hedging, and pruning, which inflict wounds of various types on foliage and young stems, but in some cases it can also be spread by wind-blown rain (9,12,17,34). Simulated wind-blown rain events move the bacteria up to 10 m from source plants and establish infections due to stomatal flooding with bacteria-laden spray water (12,30). Without subsequent wind-blown rain events or commercial spray applications, which generate wind-blown water droplets, epiphytic bacteria populations decline rapidly and associated disease gradients tend to stabilize (12,14,19). Leaf surface populations of *X. axonopodis* pv. *citrumelo* are short-lived, as are infections on nursery trees transplanted to commercial citrus plantations (12,18,37). However, wind-blown rain can cause water congestion of host tissues and

FINAL REPORT
New York State Onion Research and Development Program
(Marketing Order)
2012-2013

Role of Adjuvants in Bacterial Diseases of Onions

Funding Period and Amount Allocated:
April 1, 2012 to March 31, 2013 - $3,000

PRINCIPAL INVESTIGATORS:
Christy Hoepting, Extension Associate, Cornell Cooperative Extension Vegetable Program, Albion
Steven Beer, Dept. of Plant Pathology and Plant-Microbe Biology, Cornell, Ithaca

GROWER COOPERATORS:

Promotion of Bacterial Infection of Leaves by an Organosilicone Surfactant: Implications for Biological Weed Control

Article · June 1992 *with* 14 Reads
DOI: 10.1016/1049-9644(92)90034-B

Cite this publication

1st Nina Zidack
19.04 · Montana State University

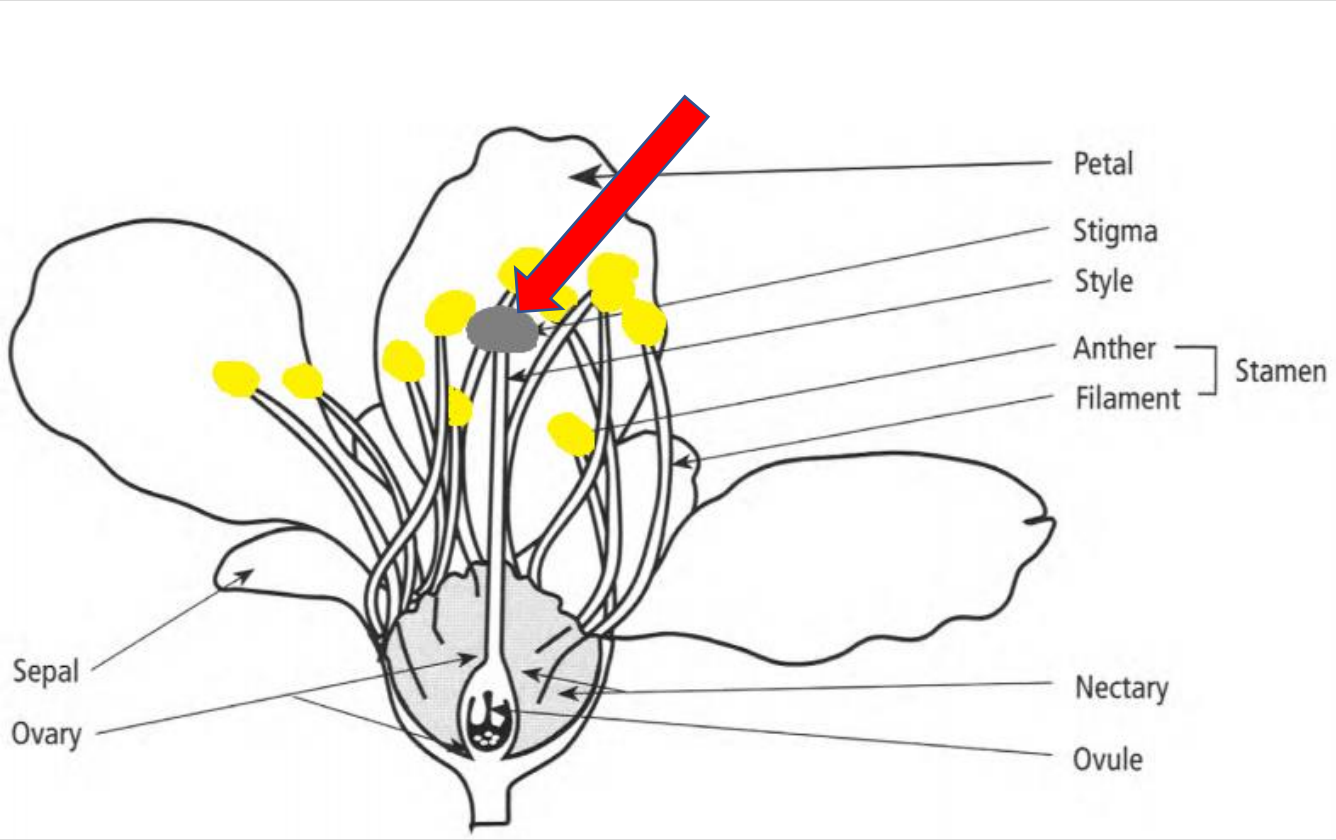
2nd P. A. Backman
29.26 · Pennsylvania State University

3rd J.J. Shaw

Abstract

A nonionic organosilicone surfactant (Silwet L-77) capable of facilitating stomatal penetration by aqueous solutions was evaluated for its capacity to enhance bacterial infections. Disease levels and bacterial populations were evaluated with the halo blight pathogen Pseudomonas syringae pv. phaseolicola (P.s.p.) on bean (Phaseolus vulgaris) using different rates of surfactant (0–0.25% v/v) and pathogen numbers (log 5–8 cfu/ml). Maximum levels of disease severity and pathogen populations in leaf tissue were obtained with a surfactant rate of ⩾0.2% and log 8 P.s.p. High levels of disease were achieved under hot, dry conditions (29°C, 55% RH) at the time of pathogen application. No disease was observed when the pathogen was applied without surfactant, regardless of pathogen numbers. An optimal rate of surfactant (0.2%) plus pathogen (log 8) was then tested on the weed kudzu (Pueraria lobata) and shown to enhance disease. Hydathode infection of cabbage (Brassica oleracea) by Xanthomonas campestris pv. campestris (X.c.c.) was studied with and without surfactant, utilizing a bioluminescent strain (FD911) for visualization of the colonization patterns of the leaf. Hydathode infections were visible as distinct bright spots on the leaf margin, while stomatal infections were visible as points of light scattered across the lamina. This model system provides data which indicate that bacterial infection and disease severity can be enhanced by using a stomata-penetrating surfactant and that this technology has potential applications in biological control.

Potential Phytotoxicity to Pollination Process



From USDA AG Handbook 496

Direct toxicities

Synergistic toxicities

Incompatible combinations

Too much stuff !

Direct Toxicities

Non-buffered phosphites

Zn++

Boron

Synergistic Toxicities

Sulfur
Captan
Chlorothalonil
Omite

↓

Oil

Low pH foliars

+

Copper or Zinc

Incompatible Combinations

Sulfur on apricots

Azoxystrobin on apples

Malathion on certain cherry varieties

Too much stuff!!

Calcium

Insecticide

Humic Acid

Adjuvant

Miticide

Phosphite

Buffer

Seaweed

Fungicide

Boron

Zinc

Thank You !

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