Use of Surround® in Walnut Production

Kathy Kelley Anderson
UCCE Farm Advisor
Stanislaus County

What is Surround?

- kaolin - a type of clay
- natural mineral - OMRI approved
- forms a white particle film on tree
- paper, cosmetics, Kaopectate

What does Surround do?

- affects the tree's microclimate
- reflects light
  - infrared wavelengths
  - ultraviolet wavelengths

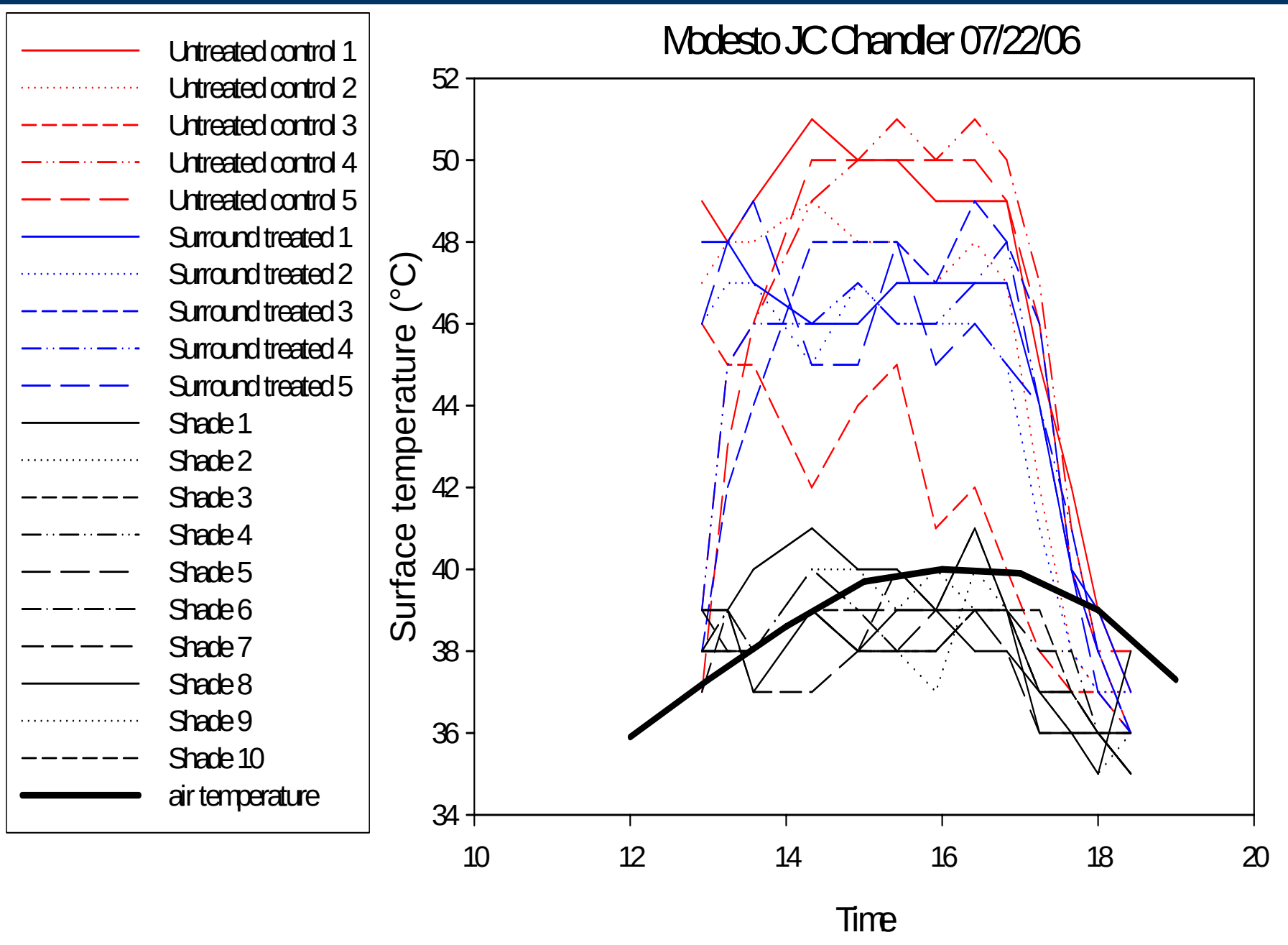
reflects heat-producing IR rays

↓ temperature & heat stress

Q: The air temperature is 102°F.

How hot are the exposed walnuts?

A: 124°F!


Modesto JC Chandler 07/22/06
Surface temperature (°C)
Time
52
50
48
46
44
42
40
38
36
34
10
12
14
16
18
20
Untreated control 1
Untreated control 2
Untreated control 3
Untreated control 4
Untreated control 5
Surround treated 1
Surround treated 2
Surround treated 3
Surround treated 4
Surround treated 5
Shade 1
Shade 2
Shade 3
Shade 4
Shade 5
Shade 6
Shade 7
Shade 8
Shade 9
Shade 10
air temperature

reflects burning UV rays
↓ sunburn

most sunburn in SW quadrant

- **lower positions especially with an indentation in the canopy**
- **↓ air circulation**
- **also more common where tree to west is a replant or is missing a scaffold**

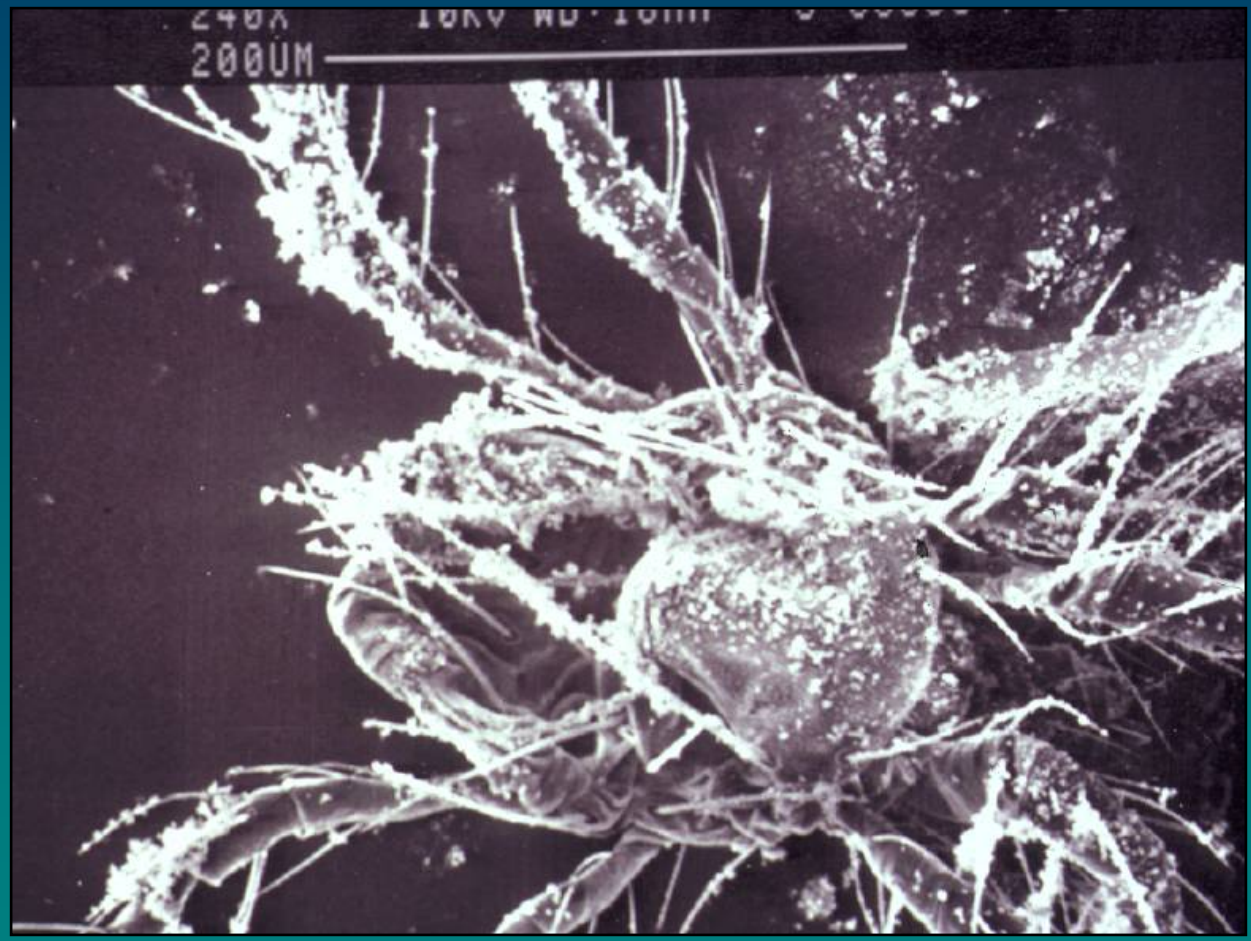
2006 trial summary

- 122°F (est.) sunburn damage T°
- nut T° can be 22°F > air T°
- Surround cools nuts by 4 - 8°F
- Surround can ↓ sunburn

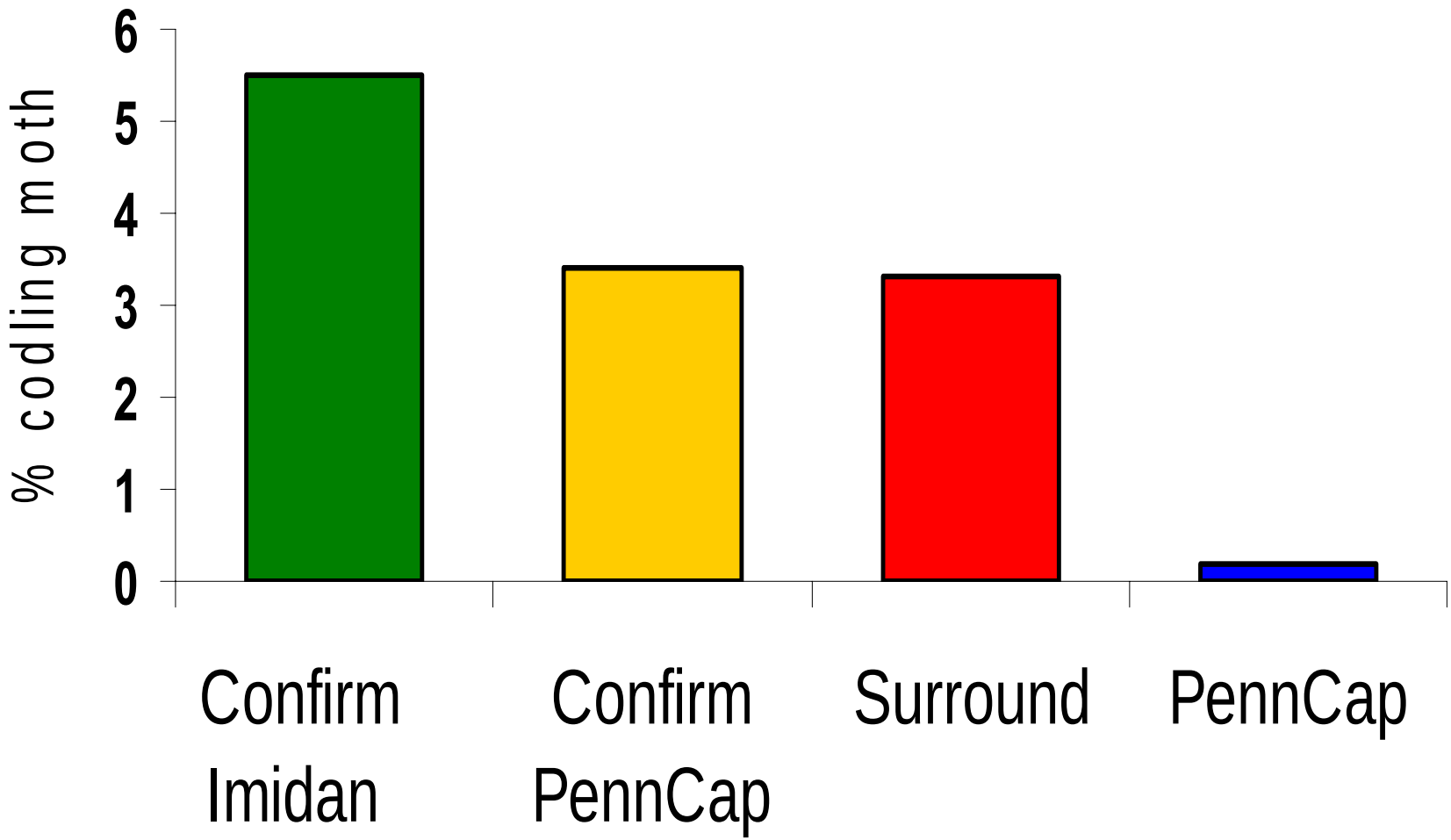
What else does Surround do?

- forms a physical barrier that suppresses codling moth and WHF damage
- white surface disorients insects
- insects dislike particle film
- desiccation

a mite surrounded by Surround



% codling moth at harvest
Ashley 1999



walnut huskfly (WHF) management with Surround

2003

W.W. Coates

UCCE Farm Advisor, San Benito Co.

R.A. Van Steenwyk

UC Entomology Specialist, Berkeley

Surround handgun sprays

timing	rate
1. June 13	50# / 200 gal
2. July 10	75# / 150 gal
3. August 15	75# / 150 gal

WHF results

	treated	untreated
% infested	1.2	98
% large	98	34
cents/lb	94	81

Are there physiological effects?

- ↑ photosynthesis as much as 30% (measured on whole tree basis)
- ↓ leaf photosynthesis in CA (4 leaves/ tree on 8 trees)
- no effect on tree water use
- no effect on gas exchange (doesn't clog leaf pores)

ground applications

- 50 lbs/100-200 gpa

ground applications

need good coverage

ground applications

- 2-3-4 applications/season
- 1st in early to mid-June
- 21 day intervals (old label)
- start spray on alternate side
- full vs. southwest only spray

Are aerial applications effective?

3 sprays at 30 lbs/20 gpa

no replicated research results

Does Surround improve walnut quality?

2004

- Modesto Junior College
- three varieties
  - Vina
  - Howard
  - Tulare

three applications

- 50 # / 200 gal / acre
- handgun
- June 15, July 5, August 2

% large sound

	check	treated	$p \leq 0.10$
Vina	0.93	0.95	0.08**
Howard	0.88	0.91	0.10*
Tulare	0.90	0.90	0.89 ns

% external damage

	check	treated	$p \leq 0.10$
Vina	0.01	0.01	0.49 ns
Howard	0.01	0.00	0.02*
Tulare	0.01	0.00	0.00**

% mold

	check	treated	$p \leq 0.10$
Vina	0.01	0.00	0.19 ns
Howard	0.02	0.00	0.00**
Tulare	0.01	0.00	0.00**

relative value (¢/lb)

	check	treated	$p \leq 0.10$
Vina	0.85	0.87	0.10*
Howard	0.85	0.91	0.02*
Tulare	0.94	0.96	0.25 ns

Are ½ sprays on SW side only effective?

2005

- MJC & Ceres
- 3 commercial applications
- 50 lbs/200 gpa

relative value (¢/lb)

	full	1/2	check
C.Vina	0.84 a	0.83 a	0.80 b
JC Vina	0.85 a	0.85 a	0.80 b
Howard	0.86 ab	0.90 a	0.86 b
Tulare	0.94 a	0.94 a	0.91 a
Chandler	0.96 b	0.96 b	1.00 a

relative value increases 2005

	cents / lb
Vina	3 - 5
Howard	4
Tulare	0

break even return vs. yield

increase ¢/lb	tons needed
.02	2.0
.03	1.3
.04	1.0
.05	0.8

2006

- Modesto Junior College
- four varieties
  - Vina
  - Howard
  - Tulare
  - Chandler

MJC

- “free” harvest when shaker has extra time
- Vina, Howard, Tulare, Chandler all harvested 3 weeks late
- mallet knocked and picked up 240 trees
- not optimum quality

significant improvement summary 2006

- Vina: large sound, shrivel, edible yield, RLI
- Howard: large sound, mold, offgrade
- Tulare: shrivel

relative value (¢/lb)

	full	1/2	check
Vina	.79 ns	.83 ns	.81 ns
Howard	.93 ns	.95 ns	.92 ns
Tulare	.93 ns	.94 ns	.91 ns
Chandler	.88 ns	.88 ns	.91 ns

conclusions

- quality benefits more likely with weaker, more sun exposed, water stressed orchards

water stress impacts with and without Surround

- water stress ↑ leaf and nut temperatures
- water stress impacts on ↑ temperature were greater than Surround cooling effects

conclusions

- cools leaves and nuts
- ↓ heat stress and sunburn
- ↓ codling moth and WHF
- full spray = ½ SW spray
- benefits vary with year, variety, and orchard

conclusions

- 2 sprays needed to build to acceptable coverage
- good coverage: 50 lbs /100-200 gpa
- border sprays are probably economic
- ↓ rates, gpa, # sprays, late sprays are not economic

conclusions

- Chandler quality is hard to ↑
- most economic benefit from ↑ quality with ↓ pest impacts
- aerial sprays applied to the tops of large walnut trees in healthy orchards are promising