WALNUT BLIGHT CONTROL INVESTIGATIONS 2003

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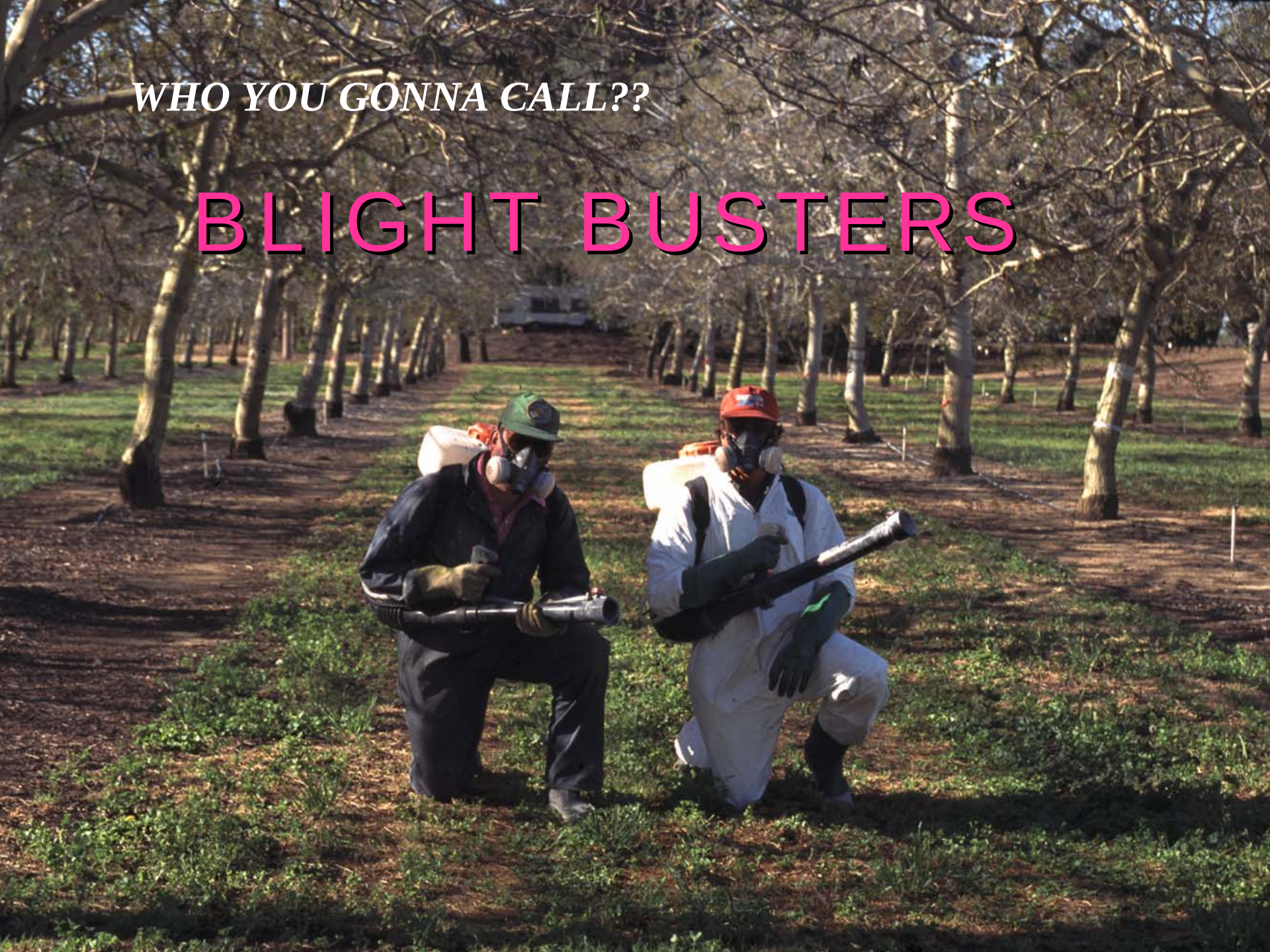
WHO YOU GONNA CALL??
BLIGHT BUSTERS

Susceptibility

- **All cultivars are susceptible**
- **Most severe on early-leafing**
- **As the season progresses, the susceptibility of the nut DECREASES**

Remember:

- **Susceptible tissue must be protected…**
  …BEFORE it rains
- **Start at early flowering 1% bloom**

Project Highlights 2003

- Rainfall simulators in the 2003 and 2004 blight plots
- Copper/Manex is the material of choice (23% blight vs. 6.72% C+M)
- Reduction in the amount of copper applied (8lbs KOC 101 > 6 lbs. KOC 2000 > 3.5 lbs. GX 569)
- We have found no superior copper product
- Alternating material “BMP” to reduce/eliminate copper runoff
- Reducing the number of applications to reduce/eliminate copper runoff

Are any copper products better than others?

No, all good quality copper formulations perform about the same if used at the correct label rate.

Serenade for Walnut Blight Control

Treatment	Canopy[1] % Blight	Ground[2] # blighted nuts	Leaf[3] Phyto
1. Kocide 2000 Pro Tech + Manex	6.72 a[4]	12.60 a	1
2. Kocide 2000 Pro Tech	23.00 b	18.20 a	1
3. Serenade	22.71 b	19.20 a	1
4. Serenade + Kocide 2000	31.28 b	30.60 a	1
5. Control (artificial rain)	34.90 b	20.60 a	1
6. Control (natural conditions)	34.58 b	50.80 b	1

[1]Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

[2]Average number of blighted walnuts per tree on the ground, counted 6/12/03.

[3]Leaf phytotoxicity visually rated using a scale of 1-5 where a rating of 1 represents no observable phytotoxicity.

[4]Duncan's multiple range test for treatment means at the 5% level.

Figure 11. Percent blighted walnuts, blighted walnuts for dropped nut counts and leaf phyto for Serenade comparisons.

New Materials for Walnut Blight Control

Treatment	Canopy[1] % Blight	Ground[2] # blighted nuts	Leaf[3] Phyto
1. Kocide 2000 Pro Tech + Manex	6.72 b	12.60 a[4]	1
2. Kocide 2000 Pro Tech	23.00 a	18.20 a	1
3. DBNPA + Bond (1x)	29.75 a	15.00 a	1
4. DBNPA + Bond (2x)	27.06 a	26.60 a	1
5. Zerotol (1x)	19.87 ab	12.80 a	1
6. Zerotol (2x)	35.11 a	30.20 a	1
7. Control (artificial rain)	34.90 a	20.60 a	1
8. Control (natural conditions)	34.58 a	50.80 b	1

[1]Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

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[4]Duncan's multiple range test for treatment means at the 5% level.

Figure 12. Blight Damage ratings for DBNPA and Zerotol comparisons.

Commercial Copper Formulations For Walnut Blight Control

Treatment	Canopy[1] % Blight	Ground[2] # blighted nuts	Leaf[3] Phyto
1. Kocide 2000 Pro Tech	23.00 ab[4]	18.20 b[4]	1
2. Kocide 2000 Pro Tech + Manex	6.72 c	12.60 b	1
3. Champ Dry Prill	19.63 bc	14.60 b	1
4. Champ Dry Prill + Manex	9.36 c	10.60 b	1
5. Control (artificial rain)	34.90 a	20.60 b	1
6. Control (natural conditions)	34.58 a	50.80 a	1

[1]Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

[2]Average number of blighted walnuts per tree on the ground, counted 6/12/03.

[3]Leaf phytotoxicity visually rated using a scale of 1-5 where a rating of 1 represents no observable phytotoxicity.

[4]Duncan's multiple range test for treatment means at the 5% level.

Figure 13. Blight Damage ratings for Champ Dry Prill comparisons.

New Copper Formulations for Walnut Blight Control

Treatment	Canopy[1] % Blight	Ground[2] # blighted nuts	Leaf[3] Phyto
1. Kocide 2000 Pro Tech	23.00 ab[4]	18.20 b[4]	1
2. Kocide 2000 Pro Tech + Manex	6.72 c	12.60 b	1
3. GX 569 + Manex (low rate)	4.36 c	17.40 b	1
4. GX 569 + Manex (high rate)	10.65 bc	13.20 b	1
5. Control (artificial rain)	34.90 a	20.60 b	1
6. Control (natural conditions)	34.58 a	50.80 a	1

[1]Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

[2]Average number of blighted walnuts per tree on the ground, counted 6/12/03.

[3]Leaf phytotoxicity visually rated using a scale of 1-5 where a rating of 1 represents no observable phytotoxicity.

[4]Duncan's multiple range test for treatment means at the 5% level.

Figure 14. Blight Damage ratings for GX 569 comparisons.

Nordox 75 WG Evaluation

Treatments	Rate/Acre	% Walnut Blight[1]
1. Kocide 2000 + Manex	6 lbs. + 58 oz.	1.75 b
2. Nordox 75 WG + Manex	5 lbs. + 58 oz.	1.68 b
3. Nordox 75 WG + Manex	4 lbs. + 58 oz.	.89 b
4. Untreated Check	—	5.15 a

[1]Means not followed by a common letter are significantly different from one another at the 5% level of significance.

Figure 15. Percent walnut blight for the Nordox comparisons.

A Look Back at Effective Products

1990 – Olson et al. Champion and Champ Flowable

1991 – Olson et al. Nordox, Champ Flowable, CT-N and Kocide DF

1992 – Olson/Buchner No Copper Comparisons

1993 – Olson/Buchner Kocide 101 + Manex

1994 – Olson/Buchner Nordox, Kocide 101 + Manex

1995 – Buchner/Olson Kocide 101 + Nordox and Manex, Zinc

1996 – Buchner/Olson Blue Shield, Manex

1997 – Olson/Buchner Zinc Bordeaux, 6 lbs. Kocide 2000 + Manex

1998 – Buchner/Olson Kocide 101/Manex, Nu Cop + Manex

1999, 2000, 2001, 2002 Low Blight Pressure

2003 – Buchner/Olson Nordox 75 WG, Kocide 2000 6 lbs, Champ Dry Prill 5.6 lbs

A Look Back at Non-Effective Products

1991 – Olson et al. Iron Chloride/Iron Oxide

1992 – Schroth, et. al. Iron additions did not improve control

1993 – Olson/Buchner FeCl3 + MgSO4 + CS7 + AG44M

1994 – Olson/Buchner Surfactants increase phyto and not disease control

1995 – Buchner/Olson Terramycin and Streptomycin, NFA

1996 – Buchner/Olson NuFilm P, NuFilm 17 and CS-7, Zinc Phyto

1997 – Olson/Buchner

1998 – Buchner/Olson DTEA, Ziram, Actigard, B694, DBNPA, PHMP, KOC 20/20 and Copper Count N

1999, 2000, 2001, 2002 Low Blight Pressure

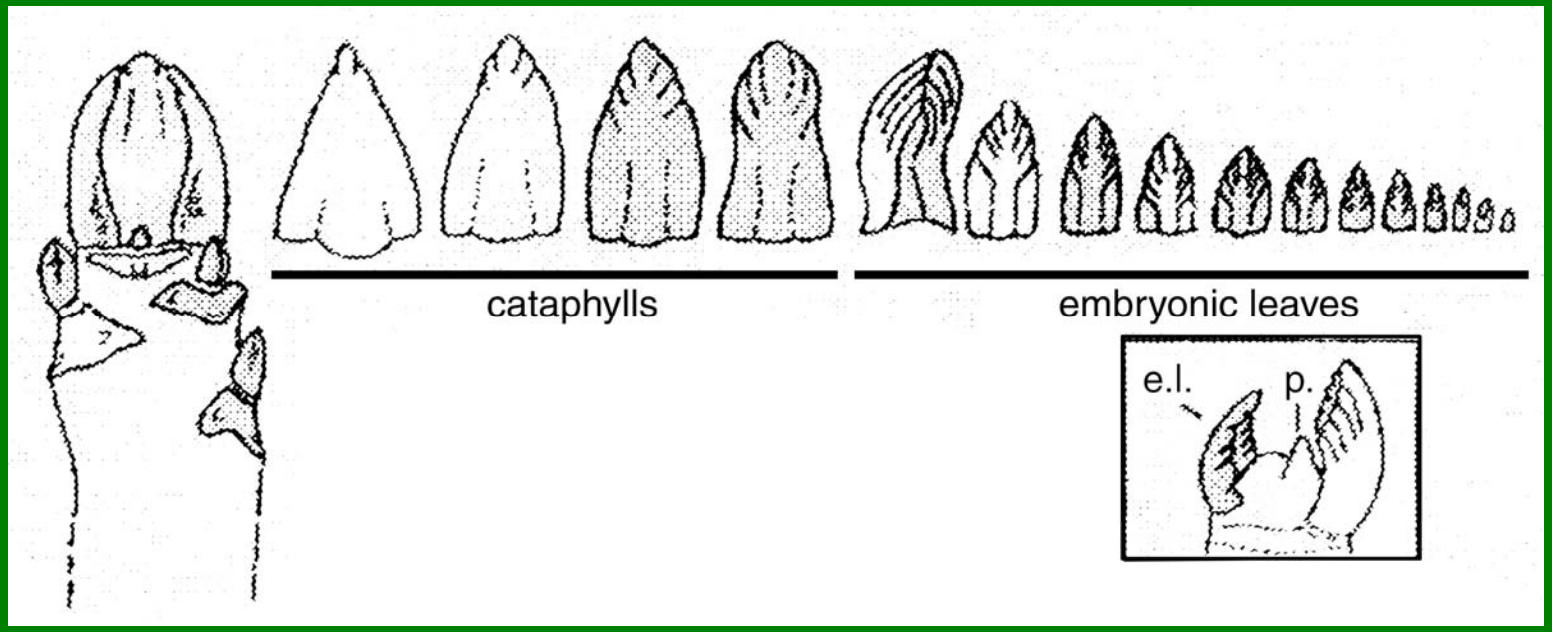
2003 – Buchner/Olson DBNPA, Zerotol, Serenade

Do the bud break sprays work?

Lindow, et.al. Monocyclic / Polycyclic

Monocyclic – complete only one or part of one, disease cycle in one year (single-cycle pathogens

- The primary inoculum is the only inoculum available for the entire season.
- No secondary inoculum.
- Amount of inoculum may increase from year to year.
- Severity is driven by initial inoculum.



- Inoculum primarily within buds.
- Organo – silicon surfactant + copper/Manex can reduce population.
- One week after terminal bud break.

2003 Bud Break "Erradicant" Spray Strategy Evaluation

Treatments	% Blight
1. Untreated control	31.15 a[1]
2. Kocide + Manex + 0.2% Breakthru 100 gpa	14.13 b
3. Kocide + Manex + 0.5% Breakthru 100 gpa	14.73 b
4. Kocide + Manex + 0.2% Breakthru 200 gpa	9.68 bc
5. Kocide + Manex + 0.5% Breakthru 200 gpa	3.87 c
6. Grower standard	0.35 c

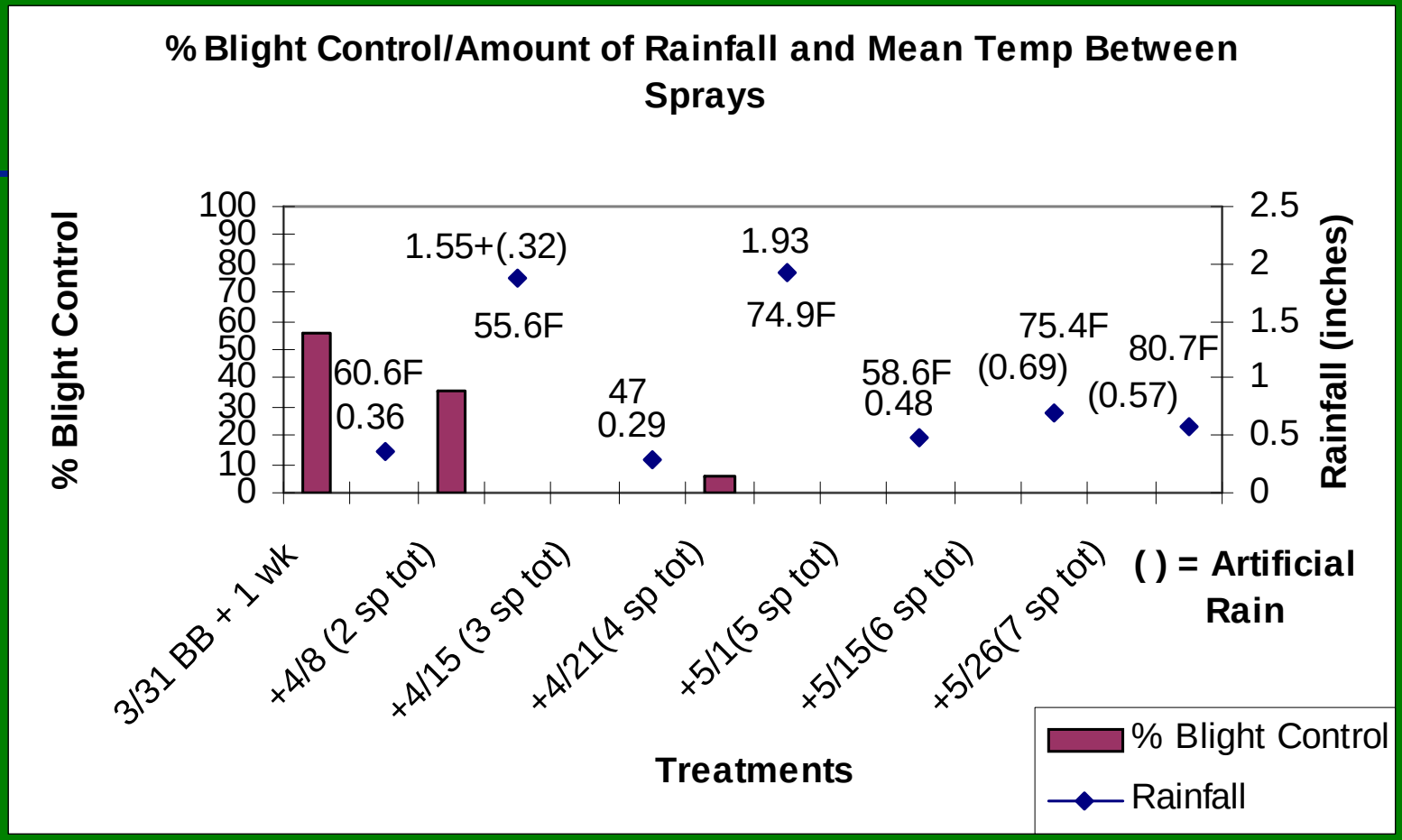
- Single spray Kocide 2000 + Manex (6 lbs. + 58 oz.)
- Applied one week after pistillate bud break (3/31/03)
- Five replicates, blight rated 6/12/03
- Grower standard – nine ½ sprays

Best Treatment Timing – Rainfall Stimulation

One week after terminal bud break[a]	In-Season Sprays[b]						% Blight[c]
3/31/03	4/8/03	4/15/03	4/21/03	5/1/03	5/15/03	5/26/03	
x	x	x	x	x	x	x	0.95 c
x	x	x	x	x	x		1.24 c
x	x	x	x	x			0.97 c
x	x	x	x				1.14 c
x	x	x					4.7 c
x	x						4.39 c
x							25.46 b
x[b]							24.44 b
	x	x	x	x	x	x	1.1 c
Nontreated							57.4 a

a – Kocide + Manex + Breakthru
b – Kocide + Manex
c - Treatment means that are not followed by a common letter are significantly different from each other at the 5% level according to Duncan's Multiple Range Test for Mean Separation.

Figure 19. Blight damage compared to spray application timing.



*BB = 1 week after terminal Bud Break

Figure 20. Percent blight control, amount of rainfall and mean temperature between sprays.

Does the blight model “Xanthocast” work?

Adaskaveg, et.al. Polycyclic / Monocyclic

Polycyclic – can complete many disease cycles per year

- Overwintering inoculum usually low.
- Inoculum can multiply many fold.
- Can cause explosive epidemics.
- Speed and severity is driven by temperature and wetness.

Xanthocast spray timing compared to a research, grower and erradicant strategy for 2002

	Research Spray Schedule	Grower Spray Schedule	Xanthocast Spray Schedule	Erradicant Spray Schedule	Untreated Control
	4/6	3/28	–	3/29	–
	4/12	4/1	4/12	–	–
	4/25	4/10	–	–	–
	5/3	4/20	5/3	–	–
	5/13	4/29	–	–	–
	5/22	5/1	5/17	–	–
# sprays	6	6 (half)	3	1	0
% blight	.36 a	.54 a	.88 a	.77 a	.84 a

Xanthocast Performance in Butte County – 2003 – Vina Variety

Research	Grower[1]	Xanthocast	Control
—	3/26	—	—
—	3/28	—	—
—	—	3/31	—
4/8	4/8	—	—
4/15	—	—	—
—	4/17	—	—
4/21	—	4/21	—
—	4/26	—	—
5/1	5/1	—	—
—	5/6	5/6	—
—	5/14	—	—
5/15	—	—	—
5/26	—	—	—
—	5/29	—	—
% blight 1.1 a	0.35 a	4.09 a	16.8 b

[1]Grower applications were half sprays

Xanthocast Performance in Tehama County – 2003 – Ashley Variety

Research	Grower[1]	Xanthocast	Erradicant	Control In	Control Out
—	3/25	—	3/25	—	—
—	3/27	—	—	—	—
3/31	—	—	—	—	—
—	4/8	—	—	—	—
4/10	—	—	—	—	—
—	4/15	—	—	—	—
4/22	—	—	—	—	—
—	4/26	—	—	—	—
5/1	5/1	5/1	—	—	—
5/7	5/7	5/7	—	—	—
—	5/9	—	—	—	—
5/16	—	—	—	—	—
—	5/21	—	—	—	—
5/26	—	—	—	—	—
% blight	6.72 c[2]	10.72 c	17.26 bc	23.76 ab	34.90 a	34.58 a

[1]Grower applications were half sprays

Things to Consider for Blight Control

- Start treatment somewhere between pre-bloom and 1%.
- Watch rainfall predictions for timing.
- Early applications may be the workhorses.
- Use material and rate proven effective.
- Spray for good coverage.
- Be cautious through May.
- Experiment with new ideas but use caution.