

# WALNUT BLIGHT CONTROL INVESTIGATIONS 2003



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*WHO YOU GONNA CALL??*

# BLIGHT BUSTERS









# Susceptibility

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



# Remember:

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



## Project Highlights 2003

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- ❖ 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



# Build a Blight Generator by Installing Overhead Sprinklers in Test Walnut Orchards

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- Tehama Artificial Rain 5/17 and 5/27
- Butte Artificial Rain 4/8, 5/15 and 5/26









# Evaluate New Products for Walnut Blight Control. Support Manex Registration (5 comparisons)

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- ✦ Serenade for walnut blight control
- ✦ New materials for walnut blight control
- ✦ Commercial copper formulations
- ✦ New formulations
- ✦ Nordox 75 WG evaluation



# Serenade for Walnut Blight Control

| <u>Treatment</u>                | <u>Canopy<sup>1</sup><br/>% Blight</u> | <u>Ground<sup>2</sup><br/># blighted nuts</u> | <u>Leaf<sup>3</sup><br/>Phyto</u> |
|---------------------------------|--|---|-----------------------------------|
| 1. Kocide 2000 Pro Tech + Manex | 6.72 a <sup>4</sup>                    | 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                                 |

<sup>1</sup>Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

<sup>2</sup>Average number of blighted walnuts per tree on the ground, counted 6/12/03.

<sup>3</sup>Leaf phytotoxicity visually rated using a scale of 1-5 where a rating of 1 represents no observable phytotoxicity.

<sup>4</sup>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

| <u>Treatment</u>                | <u>Canopy<sup>1</sup><br/>% Blight</u> | <u>Ground<sup>2</sup><br/># blighted nuts</u> | <u>Leaf<sup>3</sup><br/>Phyto</u> |
|---------------------------------|--|---|-----------------------------------|
| 1. Kocide 2000 Pro Tech + Manex | 6.72 b                                 | 12.60 a <sup>4</sup>                          | 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                                 |

<sup>1</sup>Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

<sup>2</sup>Average number of blighted walnuts per tree on the ground, counted 6/12/03.

<sup>3</sup>Leaf phytotoxicity visually rated using a scale of 1-5 where a rating of 1 represents no observable phytotoxicity.

<sup>4</sup>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

| <u>Treatment</u>                | <u>Canopy<sup>1</sup><br/>% Blight</u> | <u>Ground<sup>2</sup><br/># blighted nuts</u> | <u>Leaf<sup>3</sup><br/>Phyto</u> |
|---------------------------------|--|---|-----------------------------------|
| 1. Kocide 2000 Pro Tech         | 23.00 ab <sup>4</sup>                  | 18.20 b <sup>4</sup>                          | 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                                 |

<sup>1</sup>Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

<sup>2</sup>Average number of blighted walnuts per tree on the ground, counted 6/12/03.

<sup>3</sup>Leaf phytotoxicity visually rated using a scale of 1-5 where a rating of 1 represents no observable phytotoxicity.

<sup>4</sup>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

| <u>Treatment</u>                | <u>Canopy<sup>1</sup><br/>% Blight</u> | <u>Ground<sup>2</sup><br/># blighted nuts</u> | <u>Leaf<sup>3</sup><br/>Phyto</u> |
|---------------------------------|--|---|-----------------------------------|
| 1. Kocide 2000 Pro Tech         | 23.00 ab <sup>4</sup>                  | 18.20 b <sup>4</sup>                          | 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                                 |

<sup>1</sup>Visual inspection of blighted walnuts within the tree canopy 6-12 feet above ground.

<sup>2</sup>Average number of blighted walnuts per tree on the ground, counted 6/12/03.

<sup>3</sup>Leaf phytotoxicity visually rated using a scale of 1-5 where a rating of 1 represents no observable phytotoxicity.

<sup>4</sup>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

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| <u>Treatments</u>       | <u>Rate/Acre</u> | <u>% Walnut Blight<sup>1</sup></u> |
|-------------------------|------------------|------------------------------------|
| 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                             |

<sup>1</sup>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.



# Best Treatment Timing

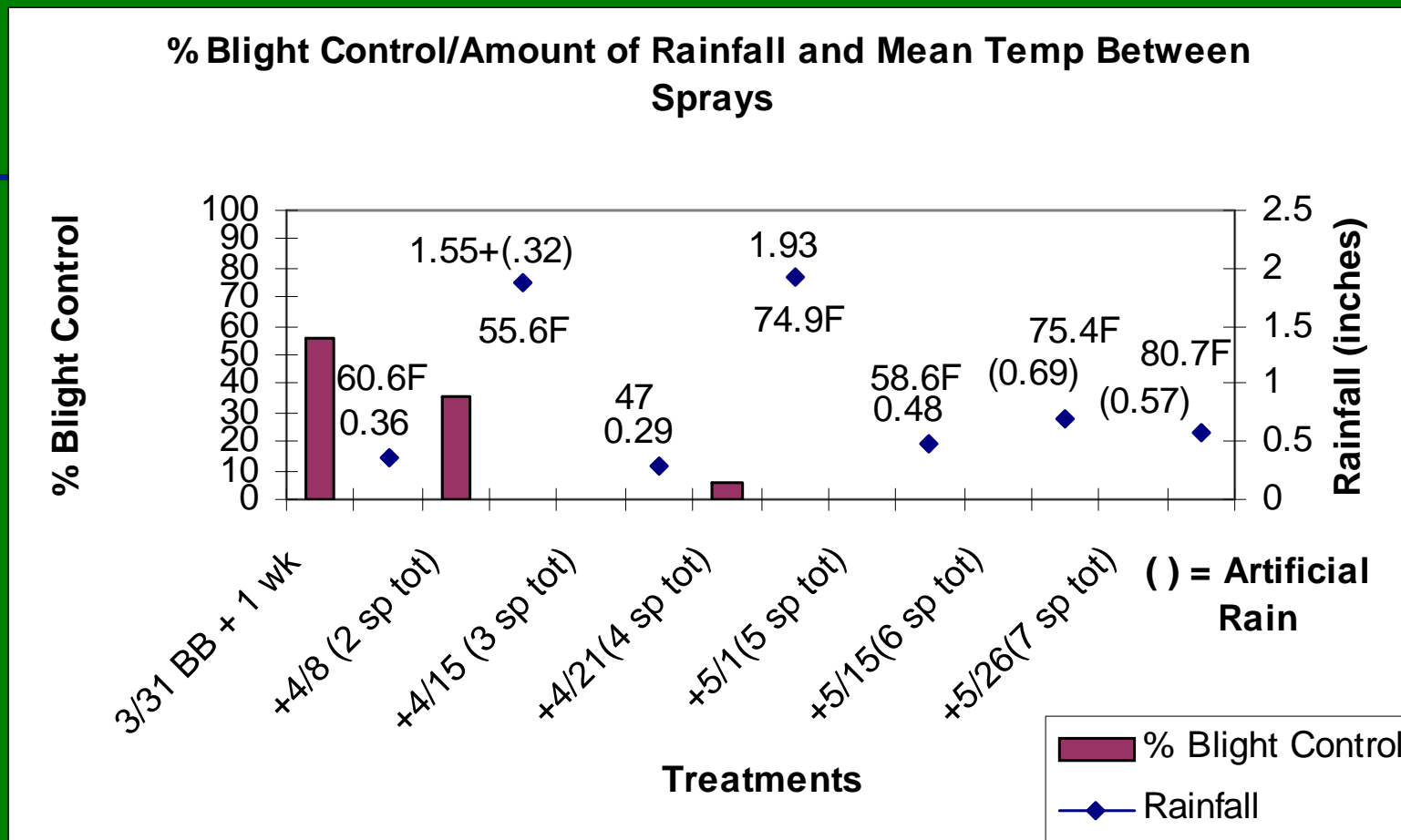
| One week after terminal bud break <sup>a</sup> | In-Season Sprays <sup>b</sup> |         |         |        |         |         | % Blight <sup>c</sup> |
|--|-------------------------------|---------|---------|--------|---------|---------|-----------------------|
|  | 4/8/03                        | 4/15/03 | 4/21/03 | 5/1/03 | 5/15/03 | 5/26/03 |                       |
| 3/31/03  |                               |         |         |        |         |         |                       |
| 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 <sup>b</sup>                                 |                               |         |         |        |         |         | 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.



## A Look Back at Effective Products

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- 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

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1991 – Olson et al. Iron Chloride/Iron Oxide

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

1993 – Olson/Buchner FeCl<sub>3</sub> + MgSO<sub>4</sub> + 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

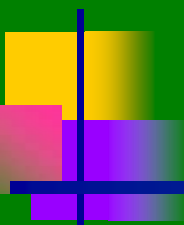
1997 – Olson/Buchner

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, Zerotel





# Tehama County Chandler, Tulare and 76-80 Evaluation

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Richard Buchner, Gale McGranahan,  
Chuck Leslie, Cyndi Gilles & Lisa Zane



## Paradox Planted 1996, Grafted 1996 & 1997 5 individual trees per treatment. (RCB design)

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- Average leaf, bloom and harvest at Chico

| <u>Variety</u> | <u>Leaf</u> | <u>First Bloom</u> | <u>Harvest</u> |
|----------------|-------------|--------------------|----------------|
| Chandler       | 4/13/03     | 4/29               | 10/13          |
| Tulare         | 4/12        | 4/18               | 10/6           |
| 76/80          | ?           | ?                  | ?              |

- First Harvest 10/18/02
- Second Harvest 10/20/03
- Blight Sprays 4/22, 4/28 and 5/9/03





# Yield and Quality

|          | % Blight |       | % Mold |       | % Shrivel |       | % E. Light |        | % Light |        | % L. Amber |        |
|----------|----------|-------|--------|-------|-----------|-------|------------|--------|---------|--------|------------|--------|
|          | 02       | 03    | 02     | 03    | 02        | 03    | 02         | 03     | 02      | 03     | 02         | 03     |
| Tulare   | 0        | 2.8 a | .80 a  | 3.0 a | 2.0 a     | 3.0 b | 31.7 b     | 13.5 c | 49.5 a  | 51.8 a | 15.2 ab    | 29.2 a |
| Chandler | 0        | .78 b | .40 a  | .45 a | .60 b     | 3.1 b | 72.4 a     | 45.7 a | 18.4 b  | 43.4 a | 7.6 b      | 9.9 b  |
| 76-80    | 0        | 0 b   | 1.00 a | 3.0 a | .80 b     | 6.0 a | 31.2 b     | 27.1 b | 42.8 a  | 55.1 a | 23.0 a     | 12.7 b |



# Yield and Quality

|          | % Large |         | % Offgrade |       | Yield/Ac @ 48T/Ac |       | Total Payment/1000 |          | Total Payment/Ac |        |
|----------|---------|---------|------------|-------|-------------------|-------|--------------------|----------|------------------|--------|
|          | 02      | 03      | 02         | 03    | 02                | 03    | 02                 | 03       | 02               | 03     |
| Tulare   | 97.6 a  | 98.7 a  | 1.4 a      | 3.5 a | 1.2 a             | 1.2 a | 912.47a            | 866.06c  | 2288 a           | 2196 a |
| Chandler | 98.8 a  | 97.4 a  | .84 a      | .92 a | .67 b             | .82 a | 887.35a            | 1068.98a | 1213 b           | 1932 b |
| 76-80    | 96.6 a  | 100.0 a | 2.36 a     | 4.7 a | .68 b             | .67 b | 864.91a            | 926.01b  | 1192 b           | 1255 b |