

UC Cooperative Blight Project

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Walnut Blight Bacteria

- **Overwinters in dormant buds and catkins**
- **Multiply in the presence of free moisture**
- **Are spread by moving water**
- **Optimum temperature for growth 82-90° F. Infection temperature is roughly 55° F**
- **Infection requires moisture for 5-15 minutes**





Susceptibility

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

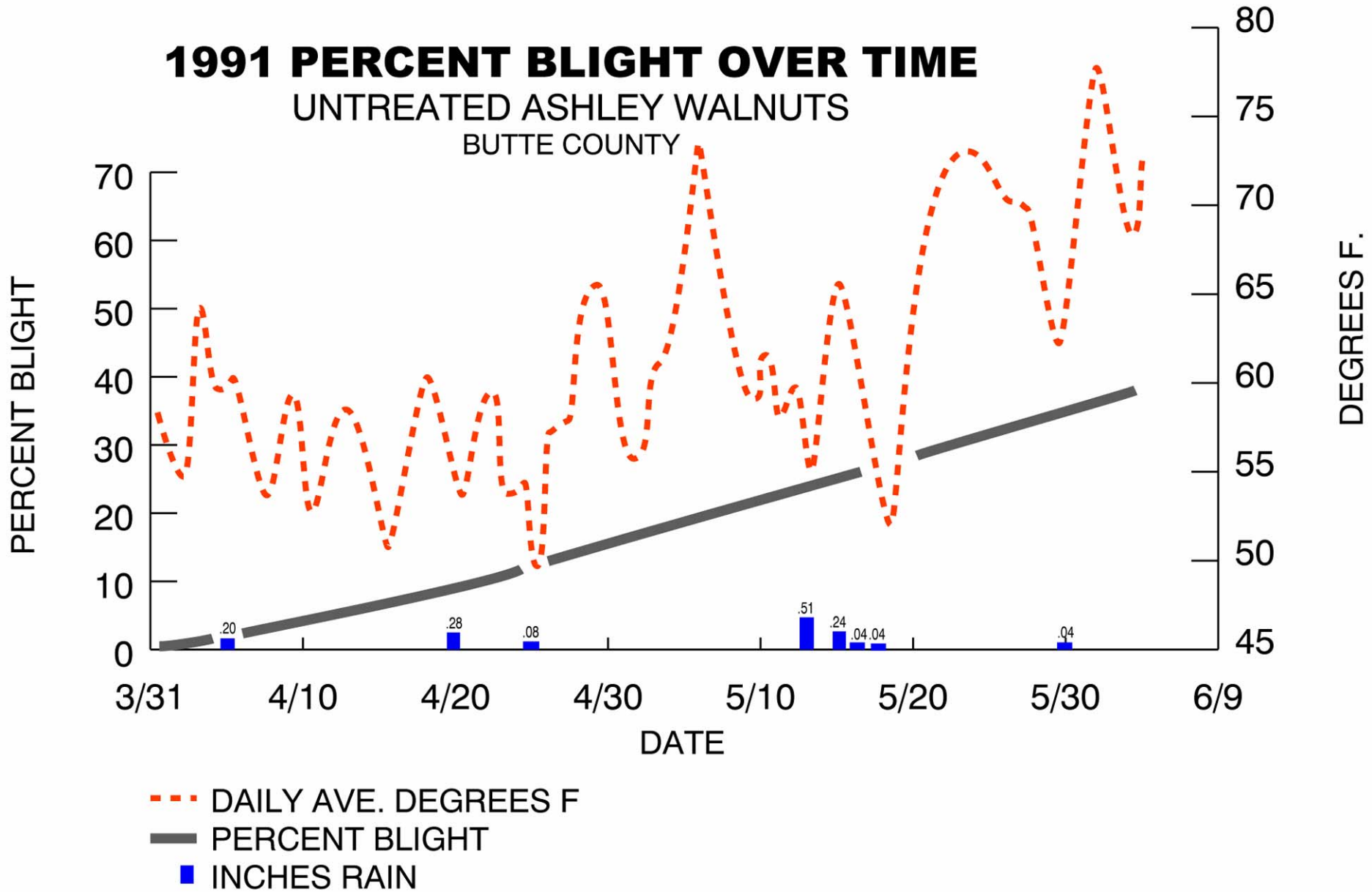
Remember:

- Susceptible tissue must be covered by a protective coating of copper... ..**BEFORE** it rains

1991 PERCENT BLIGHT OVER TIME

UNTREATED ASHLEY WALNUTS

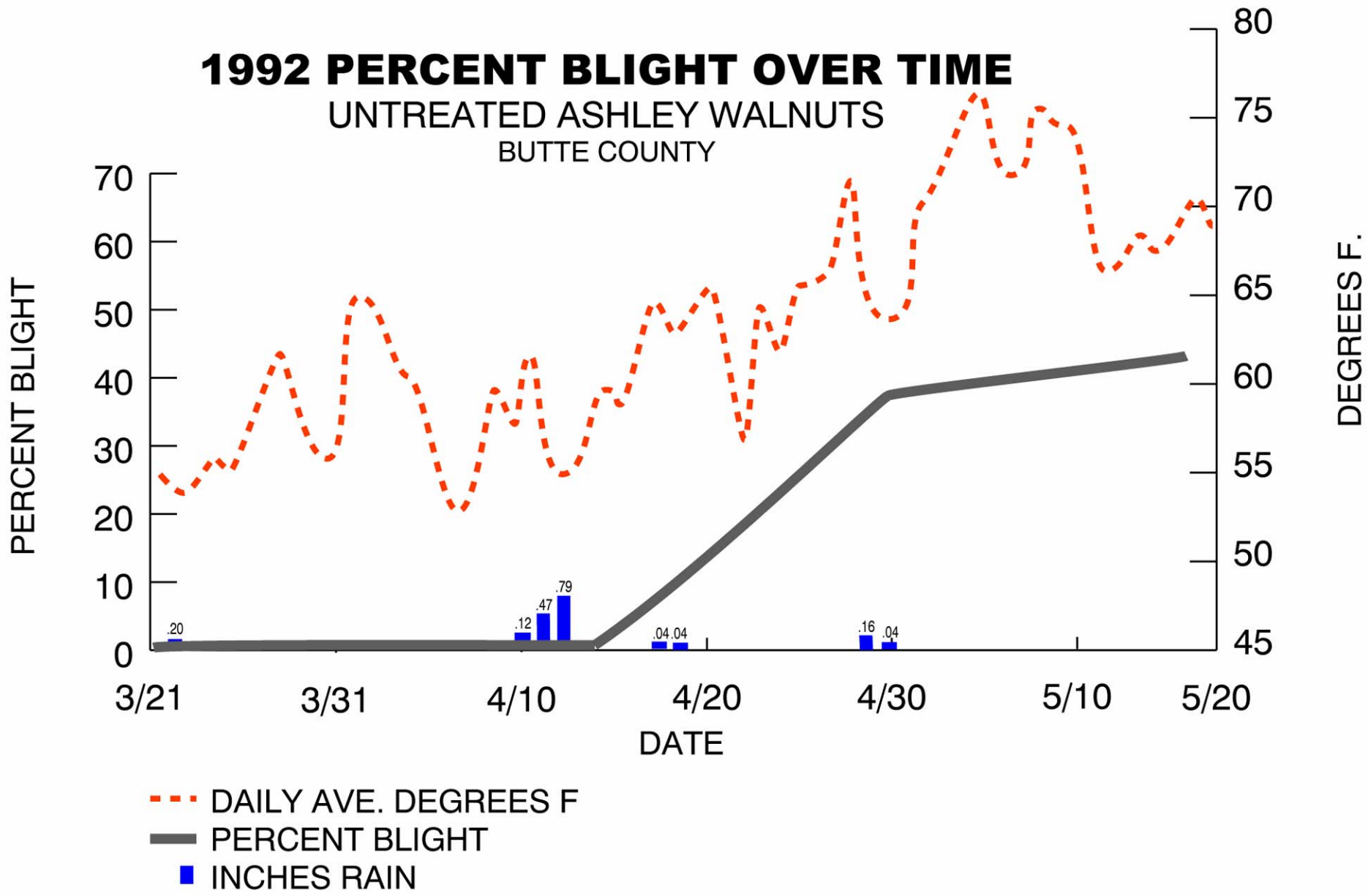
BUTTE COUNTY



1992 PERCENT BLIGHT OVER TIME

UNTREATED ASHLEY WALNUTS

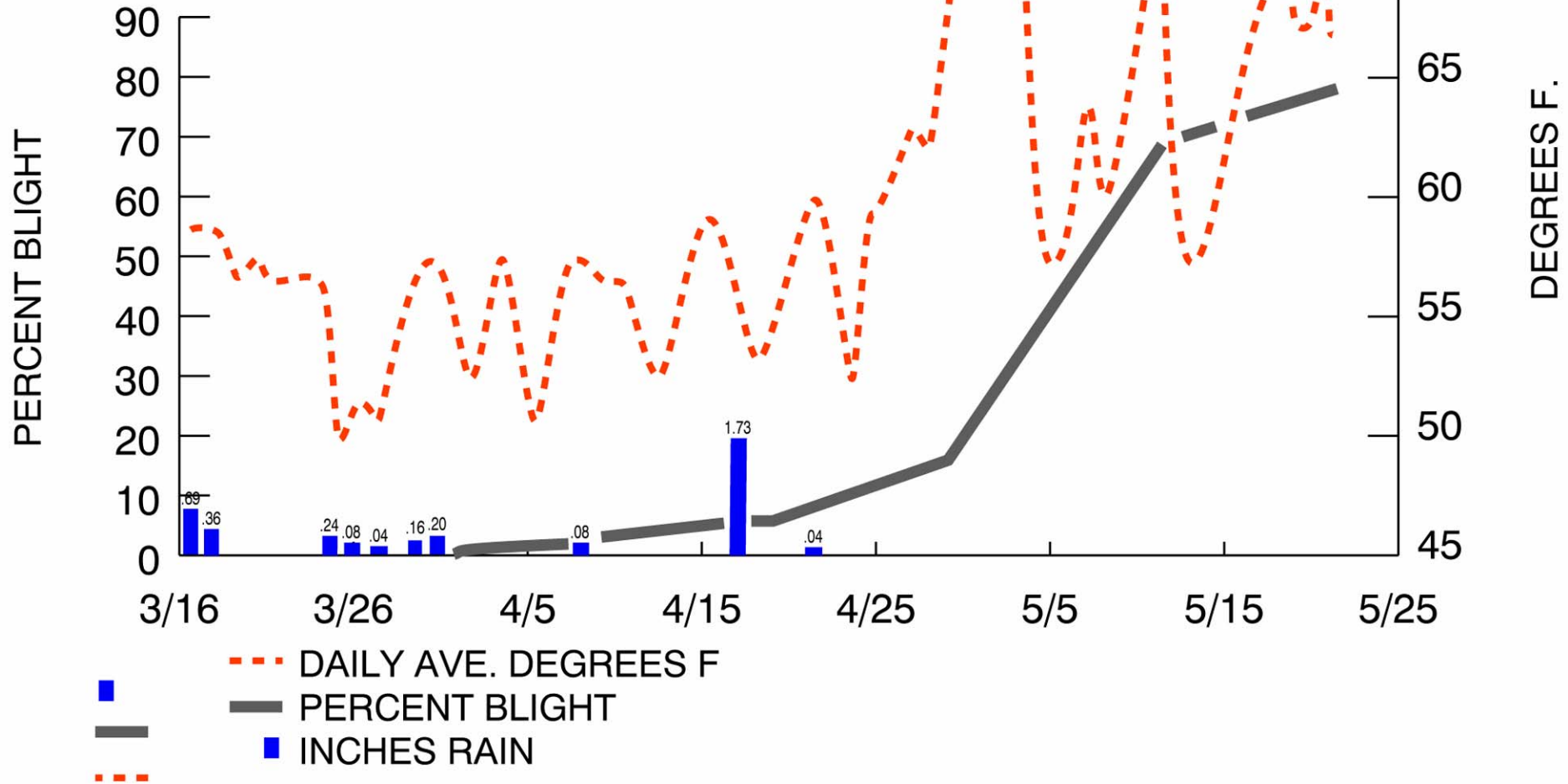
BUTTE COUNTY



1993 PERCENT BLIGHT OVER TIME

UNTREATED ASHLEY WALNUTS

BUTTE COUNTY



WHO YOU GONNA CALL??

BLIGHT BUSTERS





Treatment Efficacy in Copper Tolerant Ashley Orchard

<u>Treatment</u>	<u>% Blighted Nuts</u>	<u>Leaf Phytotoxicity</u>	<u>Nut Phytotoxicity</u>
Kocide 101	18.0 b	2.0 b	1.8 b
Kocide 101 + Manex	10.9 c	1.8 b	1.6 b
Untreated Control	49.4 a	1.1 a	1.1 a

Incidence of Walnut Blight (%) from Varying Ratios of Kocide & Manex

<u>Treatment</u>	Kocide <u>4 lbs.</u>	Kocide <u>6 lbs.</u>	Kocide <u>8 lbs.</u>
Manex 1 qt.	35.8 b	28.7 bc	32.1 b
Manex 2 qt.	25.9 c	23.9 c	27.7 bc*
Manex 3 qt.	29.8 bc	26.6 bc	23.5 c

*Current recommended ratio

Materials and Rates for Spray Treatments

<u>Material</u>	<u>Rate/Acre</u>	<u>Spray Concentration</u>
ZnSO ₄ (36% Zn)	4 lbs.	1 lb./100 gal.
Neutral Zn (52% Zn)	2.8 lbs.	.7 lb./100 gal.
Liquid Zn (7% Zn)	2 gal.	2 qts./100 gal. 21.4 oz./
Champ II/Manex	.67 gal./2 qts.	16oz./gal.

Percent Blighted Walnuts and Leaf Phytotoxicity for Alternating Copper/Manex and Zinc Treatments

<u>Treatment</u>	<u>% Blight</u>	<u>Phyto</u>
Champ II+Manex alt. With Liquid Zn	1.93 a	2.85 a
Champ II+Manex alt. With ZnSO ₄	1.78 a	3.71 b
Champ II+Manex alt. With Neutral Zn	3.02 a	0.42 c
Untreated Control	6.28 b	0.28 c

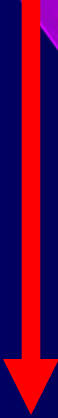
<u>Material</u>	<u>Rate</u>
ZnSO ₄ + lime (dilute)	12/10/100
ZnSO ₄ + lime (dilute)	12/8/100
ZnSO ₄ + lime (dilute)	12/6/100
ZnSO ₄ + lime (conc)	12/8/100
ZnSO ₄	0.5 lbs./Ac.
Zn Citrate + lime (conc)	2 gal + 1 lb./100
KOC 20/20	10 lbs./Ac.
Kocide 101	8 lbs./Ac.
Kocide + Manex	8 lbs. + 58 oz./Ac.
Control	—

Figure 2. Spray materials and rates for evaluating zinc efficacy and phytotoxicity. KOC 20/20 is a premix combination of copper and zinc. ZnSO₄ contains 36% zinc.

<u>Treatment #</u>	<u>Material</u>	<u>% Blight</u>	<u>Leaf Phytotoxicity</u>
1	ZnSO ₄ (12/10/100 dilute)	37.7 ab	1.0 b
2	ZnSO ₄ (12/8/100 dilute)	45.2 a	1.0 b
3	ZnSO ₄ (12/6/100 dilute)	53.1 a	1.0 b
4	ZnSO ₄ (12/8/100 conc.)	45.4 a	1.0 b
5	ZnSO ₄	48.2 a	1.0 b
6	Zn Citrate + lime conc.	44.2 a	3.3 a
7	KOC 20/20	47.9 a	3.3 a
8	Kocide 101	47.2 a	1.3 b
9	Kocide + Manex	28.3 b	1.1 b
10	Control	53.9 a	1.0 b

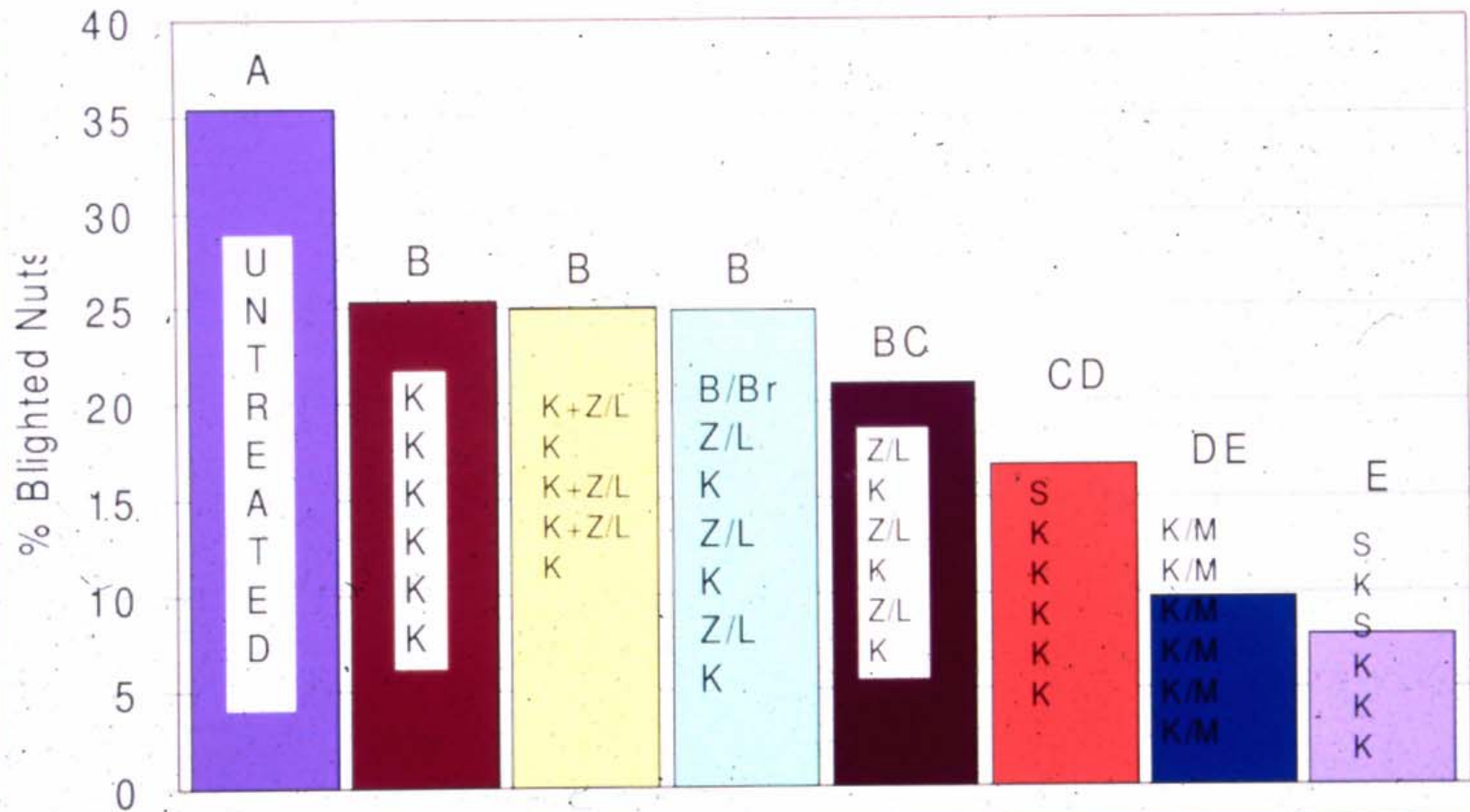
Figure 7. Percent blight and leaf phytotoxicity rating for zinc, copper and Manex treatments. 7 total sprays applied. Leaf phytotoxicity was rated on a 1-5 scale with 1 representing no visual phytotoxicity. A phytotoxicity rating of 3 or more is considered to be an economic problem.

Current and New Potential Management Strategies for Bacteriocidal Control of Walnut Blight

Program	Schedule	Risk
Single	A – A – A – A	Highest
Mixture	AB – AB – AB – AB	
Alternation	A – B – A – B	
Combination – 1	AB – C – AB – C	
Combination – 2	A – B – C – D	

A = Chemical A with Mode of Action X,
B = Chemical B with Mode of Action Y, etc.

Walnut Blight Infection Following Various Spray Programs



EFFICACY OF SERENADE FOR WALNUT BLIGHT CONTROL – TEHAMA COUNTY

<u>Treatment</u>	<u>% Blight</u>	<u>Phytotoxicity²</u>	
		<u>Leaf</u>	<u>Nut</u>
1. Kocide 2000 + Manex	.36 a	1	1
2. Kocide 2000	1.04 a	1	1
3. Serenade + Kocide 2000	1.04 a	1	1
4. Manex	.68 a	1	1
5. Untreated Control	.84 a	1	1

Table 4. Performance of Serenade plus copper for walnut blight control. Application by handgun at 400 gpa.

¹Numbers followed by the same letter are not significantly different at the 5% level.

²Phytotoxicity was visually rated using a 1-5 scale. A rating of 1 represents no observable phytotoxicity. A rating of 5 represents severe phytotoxicity.

PERFORMANCE OF NEW COPPER FORMULATIONS FOR WALNUT BLIGHT CONTROL

<u>Treatment</u>	<u>% Blight¹</u>	<u>Phytoxicity²</u>	
		<u>Leaf</u>	<u>Nut</u>
1. Kocide 2000 + Manex	.36 a	1	1
2. GX-306 + Manex	.74 a	1	1
3. Kocide 101 + Manex	.23 a	1	1
4. GX-435 + Manex	0.00 a	1	1
5. GX-569 + Manex	.24 a	1	1
6. GX-569 + Manex	1.06 a	1	1
7. Kocide 2000	1.04 a	1	1
8. Manex	.64 a	1	1
9. Untreated Control	.84 a	1	1

Table 2. Applications at handgun 400 gpa.

¹Numbers followed by the same letter are not significantly different at the 5% level.

²Phytotoxicity was visually rated using a 1-5 scale. A rating of 1 represents no observable phytotoxicity.

EFFICACY OF DBNPA & BIOACUMAN FOR WALNUT BLIGHT CONTROL – TEHAMA COUNTY

<u>Treatment</u>	<u>% Blight</u>	<u>Phytotoxicity²</u>	
		<u>Leaf</u>	<u>Nut</u>
1. Kocide 2000 + Manex	.36 a	1	1
2. Kocide 2000	1.04 a	1	1
3. DBNPA #1 + surfactant	.44 a	1	1
4. DBNPA #2 + surfactant	.45 a	1	1
5. DBNPA #3 + surfactant	.63 a	1	1
6. Bioacuman	.68 a	5	1
7. Untreated Control	.84 a	1	1

Table 3. Performance of DBNPA and Bioacuman (new liquid copper formulation) for walnut blight control. Applications by handgun at 400 gpa.

¹Numbers followed by the same letter are not significantly different at the 5% level.

²Phytotoxicity was visually rated using a 1-5 scale. A rating of 1 represents no observable phytotoxicity. A rating of 5 represents severe phytotoxicity.

EVALUATE THE EFFICACY OF SPRAYS BASED UPON THE TEMPERATURE THRESHOLD PREDICTIVE MODEL DEVELOPED BY ADASKAVEG, ET. AL. – TEHAMA COUNTY

	<u>Research</u> <u>Spray</u>	<u>Grower</u> <u>Spray</u>	<u>Xanthocast</u> <u>Spray</u>	<u>Erradicant</u> <u>Spray</u>	<u>Untreated</u> <u>Control</u>
	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	–	–
<u># sprays</u>	6	6 (half)	3	1	0
<u>% blight</u>	.36 a	.54 a	.88 a	.77 a	.84 a

Table 6. Xanthocast spray timing compared to a Research, Grower and Erradicant strategy. The grower treatment was applied by air blast at 100 gpa. The others were by handgun at 400 gpa. Numbers followed by the same letter are not significantly different at the 5% level.

New Materials Evaluated for Control of Walnut Blight in 2002

Jim Adaskaveg, Richard Buchner and Cyndi Gilles

Product	Efficacy	A.I.	Remarks
Cuprofix-DF	++++	Cu	Excellent - Continue evaluations
NuCop	+++	Cu	Effective - Continue evaluations
Axenohl	+	Cu-Ag	Register-able?
Bioacumen	++++	Cu-Pectin	Phytotoxic-Cancelled
DBNPA	+++	Biocide	Very Good - Continue evaluations
Zerotol	+++	Acidified hydrogen peroxide	Very Good - Continue evaluations
Serenade Organic	++	Biocontrol	Variable - Continue evaluations
Starner	++	Antibiotic	Cancelled by registrant

Walnut Blight Control Summary

- All copper products are about the same.
- The addition of Manex improves copper efficacy.
- Surfactants have not improved blight spray efficacy
- Follow label rates.
- Critical time is early bloom to late May.
- Effective copper residue is roughly 7 days.
- Under dry conditions treatment intervals can be “stretched.”
- “Erradicant” or population reduction spray is untested.
- Xanthocast is available from Fieldwise.com

