WALNUT BLIGHT CONTROL INVESTIGATIONS

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Objectives

1) **Evaluate the best management (BMP) spray timing for copper, copper/Manex® and zinc/lime mixes. Continue to evaluate the mix ratios and phytotoxicity problems associated with using zinc/lime.**
2) **Continue to evaluate "new" products for walnut blight control. Include DBNPA and other materials as appropriate.**
3) **Generate data to support the Manex® registration.**
4) **Evaluate the efficacy of sprays based upon the temperature threshold predictive model developed by Adaskaveg, et. al.**
5) **Continue to research rates by handgun and speed sprayer application using the bud break "erradicant" spray technique.**

EVALUATE THE BEST MANAGEMENT (BMP) SPRAY TIMING FOR COPPER, COPPER/MANEX AND ZINC/LIME MIXES – BUTTE COUNTY

Treatments	% Walnut Blight*
1. Prebloom Kocide 2000, 6 lbs/A + Manex 58 oz/A + Breakthru 2 gal/A, followed by three sprays of Kocide 2000, 6 lbs/A + Manex 58 oz/A according to xanthocast model - 4 applications	.3 a
2. Prebloom Kocide 2000, 6 lbs/A + Manex 58 oz/A + Breakthru 2 gal/A followed weekly by Kocide 2000, 6 lbs/A + Manex 58 oz/A – 7 applications	.9 a
3. Prebloom Zinc 48 lbs/A + Hydrated Lime 40 lbs/A + Breakthru 2 gal/A, followed weekly by an alternation with Kocide 2000, 6 lbs/A and Zinc 48 lbs/A + Hydrated Lime 40 lbs/A – 7 applications	.1 a
4. Prebloom Kocide 2000, 6 lbs/A + Manex 58 oz/A + Breakthru 2 gal/A, followed weekly by an alternation with Kocide 2000, 6 lbs/A + Manex 58 oz/A alternated with Zinc 48 lbs/A + Hydrated Lime 40 lbs/A + Manex 58 oz/A - 7 applications	.7 a
5. Prebloom Kocide 2000, 6 lbs/A + Breakthru 2 gal/A followed weekly by Kocide 2000, 6 lbs/A rest of season – 7 applications	.1 a
6. Prebloom Kocide 2000, 6 lbs/A + Serenade 6 lbs/A + Breakthru 2 gal/A, followed weekly by Kocide 2000, 6 lbs/A + Serenade 6 lbs/A – 7 applications	.7 a
7. No prebloom spray. Kocide 2000, 6 lbs/A + Manex 58 oz/A weekly- 6 applications	.9 a
8. No prebloom spray. Kocide 2000, 4 lbs/A + Manex 28 oz/A + Serenade 4 lbs/A + Breakthru 8 oz/A weekly –6 applications.	.3 a
9. Untreated Check	.5 a

Table 1. Walnut blight disease evaluations for the Best Management Practices evaluation. Application by handgun at 400 gpa. Means not followed by a common letter are significantly different from one another at the 5% level of significance.

PERFORMANCE OF NEW COPPER FORMULATIONS FOR WALNUT BLIGHT CONTROL

Treatment	% Blight[1]	Phytoxicity[2] Leaf	Nut
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. [1]Numbers followed by the same letter are not significantly different at the 5% level. [2]Phytotoxicity was visually rated using a 1-5 scale. A rating of 1 represents no observable phytotoxicity.

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

Treatment	% Blight	Phytotoxicity[2] Leaf	Nut
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.

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

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

EFFICACY OF SERENADE FOR WALNUT BLIGHT CONTROL – TEHAMA COUNTY

Treatment	% Blight	Phytotoxicity[2] Leaf	Nut
1. Kocide 2000 + Manex	.36 a	1	1
2. Kocide 2000	1.04 a	1	1
3. Seranade + Kocide 2000	1.04 a	1	1
4. Manex	.68 a	1	1
5. Untreated Control	.84 a	1	1

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

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

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

EFFICACY OF NORDOX, KOCIDE, SERENADE, CHAMP AND CHAMPION FOR WALNUT BLIGHT CONTROL – BUTTE COUNTY

Treatments	% Walnut Blight
1. Nordox 75 WG 8 lbs/A + Manex 58 oz/A	.05 d
2. Nordox 50 WP 8 lbs/A + Manex 58 oz/A	.25 cd
3. 1st and 4th spray: Kocide 101 6 lbs/A. + Serenade 6 lbs/A+ Silwet 2 oz/100 gal. 2nd, 3rd and 5th spray: Kocide 101 6 lbs/A + Manex 58 oz/A	.77 bc
4. Champion 8 lbs/A + Manex 58 oz/A	.37 cd
5. Champ DP 5.6 lbs/A + Manex 58 oz/A	1.00 b
6. Untreated Check	1.60 a

Table 5. Efficacy of Nordox, Kocide, Serenade, Champ and Champion for walnut blight control. Application by speed sprayer at 100 gpa. Means not followed by a common letter are significantly different from one another at the 5% level.

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

	Research Spray	Grower Spray	Xanthocast Spray	Erradicant Spray	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

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.

WALNUT BLIGHT SINGLE BEST TREATMENT TIMING – BUTTE COUNTY

X = Week Sprayed

#	Color	Erradicant 4/4	1 Week 4/11	2 Weeks 4/18	3 Weeks 4/25	4 Weeks 5/1	5 Weeks 5/9	6 Weeks 5/16	% Blight
1	Red Glow	X	X	X	X	X	X	X	.36 a
2	Red Black Stripe	X	X	X	X	X	X		.16 a
3	Orange Glow	X	X	X	X	X			1.02 a
4	Blue	X	X	X	X				.6 a
5	Blue Stripe	X	X	X					.04 a
6	Red Dot	X	X						.38 a
7	Blue Dot	X							.54 a
8	Yellow Black Stripe	X							.46 a
9	Yellow		X	X	X	X	X	X	.72 a
10	Green Black stripe	X	Model Yes	Model No	Model Yes	Model No	Model Yes	Model No	1.0 a
11	White (control)	—	—	—	—	—	—	—	1.66 a
12	Blue & Pink		X	X	X	X	X	X	.82 a

Erradicant = 1.5 lbs Kocide 2000+15 oz Manex/100 gallons+.5 % Breakthru except #8
# 8 = 1.5 lbs Kocide 2000 + 15 oz Manex/100 gallons
Weekly Sprays Except #10 = 1.5 Kocide 2000 +15 oz Manex/100 gallons
12= .5 lb Kocide 2000 +.5 lb Serenade + 3.5 oz Manex + 1 oz Breakthru/ 50 gallons

Table 7. Percent walnut blight evaluations for the Butte county spray timing experiment. All treatments applied by handgun at 400 gpa. Numbers followed by the same letter are not significantly different at the 5% level.

SPEED SPRAYER “ERRADICANT” TRIAL – BUTTE COUNTY

Treatment	Color	Material and Rate of Tank Mix	% Blight
1	White	Untreated	.8 a
2	Blue	Kocide 2000+Manex+0.2%Breakthru 200 gpa	.2 b
3	Blue Dot	Kocide 2000+Manex+0.5%Breakthru 100 gpa	.3 b
4	Pink	Kocide 2000+Manex+0.2%Breakthru 100 gpa	.3 b
5	Red Dot	Kocide 2000+Manex+0.5%Breakthru 200 gpa	.2 b
6	Grower Standard	Kocide 2000+Manex	.3 b

Table 8. Walnut blight evaluations for the speed sprayer “erradicant spray trial.” Numbers followed by the same letter are not significantly different at the 5% level.