Cooperative Extension • Monterey County

Crop Notes

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In This Issue:

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EFFICACY OF VARIOUS WATER APPLICATION RATES PER ACRE FOR REDBERRY MITE CONTROL

Mark Bolda, UC Cooperative Extension and Ed Show, Driscoll's Berry Associates

Introduction: Redberry mite (RBM) is a serious pest of commercially produced blackberries in Santa Cruz and Monterey counties in California. RBM activity prevents berries from ripening uniformly, causing from one to many druplets to remain as a bright red cluster on the otherwise black and fully ripe fruit. Affected druplets never do ripen, causing the entire fruit to be inedible and unmarketable.

Research conducted by the authors since 2003 demonstrates that horticultural oils, when used at the rate of 1.2 to 2% volume oil to volume water, gave consistent RBM control without harming marketable fruit yield when applied as four consecutive applications spaced two or three weeks apart after first green fruit set or first pink fruit stage.

A widely held assumption in horticulture is that higher gallonages of water carrier should be used when applying pesticides for the management of small organisms such as mites and fungi in order to achieve thorough coverage, even to the point of slight run-off.
Elevated water carrier GPAs are assumed to produce better pesticide distribution and subsequent target pest control.

Experiments conducted by the authors in 2006 determined that elevating GPA-water (while maintaining a 2% v/v concentration of oil) did not improve marketable yields or reduce loss due to RBM in blackberry production regions in Santa Cruz and Monterey counties. GPA-water rates as high as 575 did not provide any significant improvement in reducing loss to due to RBM compared to the grower standard GPA-water rate of 200.

The present study follows up the 2006 experiments by studying the efficacy of reductions in GPA-water below the grower standard of 200. If fruit loss due to RBM can be minimized with the use of lower rates of water and oil per acre, there are clear economic advantages.

Materials and Methods:

Location: Two trial sites were selected in well managed, commercial production 'Chester' blackberry fields. One trial site, R-1, had less vigorous plants and a smaller sized hedgerow than did the second trial site, R-2, with large vigorous plants. Treatments consisted of Golden Pest Spray Oil (GPSO) at a 2% v/v rate was applied in 50, 100 and 200 GPA-water. An untreated control was included to estimate the benefit of treatment effects relative to potential loss due to RBM.

Applications: Applications were made on May 14, May 28, June 15 and June 29, 2007. Applications were made when a large part of the blackberry crop was in the green fruit stage and were done with a motorized backpack sprayer with a hand held spray gun. To accommodate the relatively low volume of water-oil mix being applied, applications were made at 50 psi pressure and the spray gun equipped with a D-4 nozzle tip.

Evaluation: Yields for each replicate plot, measured as the weight of marketable and culled fruit due to RBM damage, were collected by members of the ranch's a professional picking crew. All plots were harvested twice per week, beginning the 1st week of July 2007. Means for total yields for each treatment were compared using Least Significant Difference test at the 95 percent level of significance.

Results:
Treatments at both locations produced similar results:
(1) Total marketable yields did not differ significantly between the different GPA-water treatment rates.
(2) Treatments produced 2.4 (R-2) to 3.5 (R-1) times the total marketable yield of the untreated controls.

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Table 1: Location R-1 Four-replicate mean yields measured as 7-lb crates

	R-1 (smaller, less vigorous plants)	Mkt Fruit July Ranch 1	RBM Fruit July Ranch 1	Mkt Fruit August	RBM Fruit August	Total Mkt Fruit	Total RBM Fruit
1	UTC	173.43 b	415.58 a	133.56 a	99.23 a	306.99 b	514.80 a
2	50 gallons	706.32 a	280.22 b	376.67 a	61.94 a	1082.99 a	342.16 b
3	100 gallons	791.08 a	232.79 b	376.49 a	57.78 a	1167.57 a	290.57 b
4	200 gallons	723.04 a	150.44 b	372.60 a	49.61 a	1095.64 a	200.05 b

Table 2: Location R-2 For-replicate mean yiled measured as 7lb crates

	R-2 (large vigorous plants)	Mkt Fruit July	RBM Fruit July	Mkt Fruit August	RBM Fruit August	Total Mkt Fruit	Total RBM Fruit
1	UTC	1015.11 b	1847.25 a	629.57 a	298.37 a	1644.68 b	2145.62 a
2	50 gallons	2800.46 a	1113.14 b	860.49 a	242.46 a	3660.95 a	1355.60 b
3	100 gallons	2869.74 a	689.99 c	719.64 a	128.39 b	3589.38 a	818.37 c
4	200 gallons	3184.47 a	527.06 c	768.08 a	104.04 b	3952.55 a	631.10 c

Discussion: In these experiments, 2% v/v Golden Pest Spray Oil treatments were equally effective in controlling redberry mite and maintaining blackberry fruit yields regardless of the 50, 100 or 200 GPA-water application rates.

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Appreciation: The authors thank Dutra Farms for their generous assistance in doing this trial.

MANAGEMENT REDUCES *E. COLI* IN IRRIGATED PASTURE RUNOFF:

Microbial pollutants, some of which can cause illnesses in humans, chronically contaminate many California water bodies. This study examined the potential to reduce *E. coli* contamination from cattle in irrigated pastures. During the 14 irrigation events examined, *E. coli* concentrations were lowest with a combination of three treatments: filtering runoff through a natural wetland, reducing runoff rates, and letting the pasture rest from grazing at least a week prior to irrigation. *Contact:* Kenneth W. Tate, UC Cooperative Extension Watershed Specialist, (530) 754-8988, kwtate@ucdavis.edu.

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WEST COAST AGRICULTURAL COOPERATIVES ARE FINANCIALLY COMPETITIVE:

In recent years, several agricultural cooperatives have experienced high-profile financial difficulties or failures. West Coast cooperatives and investor-owned firms were analyzed in the fruits and vegetables, dairy, farm supply and grain sectors, using standard financial ratios for profitability, liquidity, leverage and asset efficiency from 1991 through 2002. The overall financial performance of cooperatives on the West Coast was on par with that of similar investor-owned firms. *Contact:* Shermain Hardesty, Director, UC Small Farm Center, (530) 752-7774, sfpdirector@ucdavis.edu.

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MANDATED MARKETING PROGRAMS FOCUS ON HEALTH, FOOD SAFETY:

California farmers currently participate in 63 marketing programs, paying annual assessments of more than $226 million to support advertising, promotion, research and inspection programs. Marketing programs emphasized supply controls in the 1930s and 1940s, but now focus on generic advertising and promotion, food safety inspection, health and nutrition research, and market information. Contact: Hoy Carman, UC Davis Agricultural Economics Professor, (530) 752-1525, hfcarman@primal.ucdavis.edu.

2008 Irrigation and Nutrient Management Meeting; And Cover Crop and Water Quality Field Day
Tuesday, February 19

CONFLICT MANAGEMENT BOOK

We have begun work on the 2nd Edition of Help-ing Others Resolve Differences: Empowering Stakeholders, and I have quite a few copies left of the first edition to mail out for free. The materials are still up-to-date. The second edition will include some new chapters, however.

Those who are interested may send us $1.99 in USA stamps (it has to be stamps), and name and address on a label that I can adhere to an envelope. I provide the envelope… and the book! Please let any of your clientele know that these are available.

Send stamps and label to:
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c/o Gregorio Billikopf
University of California
3800 Cornucopia Way # A
Modesto, CA 95358-9492

FIRST ANNOUNCEMENT

University of California Cooperative Extension,
Monterey County and USDA
2008 Irrigation and Nutrient
Management Meeting;
And Cover Crop and Water Quality Field Day
Tuesday, February 19
UCCE Auditorium, Salinas

USE OF HORTICULTURAL OILS TO CONTROL POWDERY MILDEW IN STRAWBERRIES

Mark Bolda, Farm Advisor, UC Cooperative Extension

While there are many fungicides available for use in the management of this disease, horticultural oils have not been thoroughly tested in strawberry, either in their ability to control this pathogen nor the effect of their use on fruit yield.

Introduction: Powdery mildew in strawberry, *Sphaerotheca macularis*, is a significant pathogen of strawberries in California. While there are many fungicides available for use in the management of this disease, horticultural oils have not been thoroughly tested in strawberry, either in their ability to control this pathogen nor the effect of their use on fruit yield.

Materials and Methods: The trial was established in a field of Albion variety strawberry. After an initial application on February 2 (eight weeks after transplant), four treatments of four replicates were sprayed at approximate three week intervals, being April 3, April 23, May 9, May 18, June 6, July 3, July 23 and August 14, 2007. Treatments were as follows:

No.	Treatment	Concentration or rate
1.	Untreated control	-
2.	Golden Pest Spray Oil (GPSO)	½% v/v
3.	Golden Pest Spray Oil (GPSO)	1% v/v
4.	Grower Standard Fungicide Rotation	Rally- Pristine-Sulfur

Applications were made with a minimum of 100 gallons per acre, at a pressure of at least 120 psi. Spray boom had 10 8001 flat fan nozzles directed at the plant. Percent leaf area infested with powdery mildew was to be evaluated at periodic intervals, especially when conditions favored this pathogen.

Infestation of powdery mildew was almost non-existent, and not sufficient for statistical analysis.

Replicate plots were harvested, and counts and both marketable and unmarketable fruit were harvested and weighed. For purposes of evaluation, harvest was divided into two approximate halves, one ending June 18, and the other ending September 6.

All results were tested statistically using a multiple comparison procedure (Least Significant Difference at the 95 percent level of significance) to determine whether the means of fruit harvested and percent powdery mildew leaf infestation per treatment were significantly higher or lower from the other treatments.

Results and Discussion: Infestation of powdery mildew was almost non-existent, and not sufficient for statistical analysis.

However, results of treatment with different fungicides had significant effects on marketable fruit yield (Table 1). In the first half of the harvest season, plots treated with conventional fungicides had signifi-

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cantly higher yields than other treatments, yet plots treated with GPSO had significantly higher yields than the untreated plots.

There were no differences in yield of marketable fruit in the second half. Total marketable yields were reflective of the large differences in the first half of the season, with the untreated control having significantly the lowest yields of all treatments, the high rate of GPSO having the second lowest yield, and no significant differences between the low rate of GPSO and the conventional fungicide.

Table 1. Means of marketable and unmarketable fruit.

Trt No.	Treatment Name	Yield 6/18/2007 Mkt Box/A 2	Yield 6/18/2007 Unmkt Box/A	Yield 9/6/2007 Mkt Box/A	Yield 9/6/2007 Unmkt Box/A	Yield Mkt Box/A Total	Yield Unmkt Box/A Total
1	Untreated control	749.71 d	1060.954086 a	3076.9073 a	922.6023 b	3826.6166 c	1983.5565 a
2	GPSO @1%	1395.28 c	942.684054 a	3126.0570 a	1011.4345 ab	4521.3330 b	1954.1185 a
3	GPSO @ 0.5%	1987.74 b	814.428670 a	3298.6915 a	1139.4308 a	5286.4273 a	1953.8594 a
4	Grower rotation	2647.13 a	1011.545389 a	2957.4168 a	1136.1027 a	5604.5504 a	2147.6479 a

Means followed by the same letter do not significantly differ; P = 0.05

The oils, while mitigating yield loss, did detract from total yield and especially fruit yield in the first half of the season.

While this study had very little mildew detected, it was very useful in evaluating the effects of oils on fruit yield. The oils, while mitigating yield loss, did detract from total yield and especially fruit yield in the first half of the season.

EFFICACY OF K-TIONIC AND BIOZYME IN PROMOTING FRUIT YIELD AND BRIX IN STRAWBERRY

Mark Bolda, UCCE, Santa Cruz County

Introduction: The nutrient management of strawberry is generally based on the soil application of fertilizers containing the macro-nutrients nitrogen, phosphorous and potassium. It was hypothesized in this study that the addition of a nutrient uptake promoter (K-tionic) or growth enhancer (Biozyme) would enhance strawberry fruit yield and soluble solids measured as percent Brix.

It was hypothesized in this study that the addition of a nutrient uptake promoter (K-tionic) or growth enhancer (Biozyme) would enhance strawberry fruit yield and soluble solids measured as percent Brix.

Materials and Methods: A trial was done in a field of Albion variety strawberries. Drip materials were applied the full length of the strawberry bed, while foliar applied materials were applied to plots of plants in the field. All treatments were replicated four times.

An application of soil treatments of K-tionic and Biozyme was made on March 1, 2007. Subsequent applications of these materials of were made on April 3, May 1, June 6, July 3 and August 13, 2007. Test materials were mixed into a volume of water and injected into the drip tape with a portable injection pump.

Additionally, Biozyme was applied as another treatment to foliage on March 1, April 3, April 23, May 18, June 6, July 3, July 23, and August 14. Applications were made in the equivalent of 150 gallons per acre rate with a motorized backpack sprayer with a hand held boom consisting of 10 8001 flat fan nozzles.

Product	Rate (Product / Acre)	No. of Appls.	Application Interval
1. K-tionic	1.0 gal	6	One month
2. Biozyme	1.0 qt	6	One month
3. Biozyme Foliar	0.5 qt	8	Three weeks
4. Untreated control	-	-	-

Soluble solids measured as Brix were measured once on June 20. Four fruit of a similar stage of development were selected from each treatment replicate and a few droplets extracted onto a Toko brand refractometer and a measurement taken.

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Fruit were harvested from test plots on a commercial schedule, i.e. every three to four days. Both marketable and unmarketable fruit were harvested and weighed. For purposes of evaluation, harvest was divided into two approximate halves, one ending June 18, and the other ending September 6.

All results were tested statistically using a multiple comparison procedure (Least Significant Difference at the 95 percent level of significance) to determine whether the means of fruit harvested and percent Brix per treatment were significantly higher or lower from the other treatments.

Results: None of the materials or application methods resulted in a significant rise in yield of strawberry fruit. Results and statistical evaluation are given in the table below.

None of the materials tested had an effect on percent Brix of strawberry fruit on the date evaluated.

Treatment	Harvest to June 18 (in 11.5 lb boxes per Acre)		Harvest from June 18 to September 3 (in 11.5 lb boxes per Acre)		Total Harvest (in 11.5 lb boxes per Acre)	
	Marketable	Unmarketable	Marketable	Unmarketable	Marketable	Unmarketable
K-tionic drip	1668.19a	502.44a	3327.26a	1188.20a	4995.45a	1690.64a
Biozyme drip	1886.52a	436.03a	3029.52a	1186.09a	4916.03a	1622.12a
Biozyme foliar	1724.59a	494.47a	3807.86a	1192.16a	5532.45a	1686.63a
Untreated	1643.68a	539.42a	3460.13a	1146.84a	5103.81a	1686.26a

Means followed by the same letter do not significantly differ; P = 0.05

None of the materials or application methods resulted in a significant rise in percent of Brix in tested strawberry fruit. Results and statistical evaluation are given in the table below.

Treatment	% Brix
K-tionic drip	6.44 a
Biozyme drip	7.69 a
Biozyme foliar	6.13 a
Untreated	6.75 a

Means followed by the same letter do not significantly differ; P = 0.05

Conclusion: K-tionic and Biozyme applied monthly mixed with water in the drip irrigation tape at 1 gallon and one quart per acre, respectively, had no effect on the yield of fruit of strawberry in this study. Biozyme applied every three weeks to foliage at the rate of ½ quart per acre likewise had no effect on fruit yield. None of the materials tested had an effect on percent Brix of strawberry fruit on the date evaluated.

EFFECT OF STRAWBERRY TRANSPLANT CROWN SIZE ON PLANT GROWTH AND FRUIT YIELD

Mark Bolda, UC Cooperative Extension, Santa Cruz County

In particular, many organic growers wonder if a larger crown size gives plants an advantage in an unfumigated soil.

Introduction: Strawberry growers occasionally have questions about the size of strawberry transplants (i.e. crown size) and its effect on plant growth and yield. In particular, many organic growers wonder if a larger crown size gives plants an advantage in an unfumigated soil. The following study run over two years proposed to test whether strawberry crown size had any effect on strawberry fruit yield and size.

Materials and Methods:

Treatments: Both trials were placed in a well managed organic farm in Moss Landing, California. In year one, the study consisted of two treatments of "large" and "small" size transplants. Transplants were separated into two sizes, one group classified as "large" and "small" using a caliper. Measurements were done with a caliper at the middle of the crown. The following varieties will be tested at the sizes given below:

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Seascape (Organic): small ≤ 1.1 cm, large ≥ 1.2 cm
Transplants were dug 10/27/04 in Macdoel, and planted 11/16/04.
Aromas (Organic): small ≤ 1.1 cm, large ≥ 1.3 cm
Transplants were dug 10/26/04 in Macdoel, and planted 11/9/04.

In year two, the study included a third treatment, consisting of "slicks" (known as "*lisas*" in Spanish) for the varieties of Seascape and Albion. "Slicks" are very small crowns which are almost entirely made up of primary roots and no secondary roots, giving them a smooth appearance (see photo accompanying this article).

Seascape (Organic): "slicks", ≤ 1.1 cm, large ≥ 1.2 cm
Albion (Organic): "slicks", small ≤ 0.9 cm, large ≥ 1.1 cm
Both Seascape and Albion transplants were harvested in MacDoel 10/25/05, and planted 11/22/05.

Sorting took place from boxes received by the grower in the field, and treated according to standard practice by the variety. In order to achieve proper replication, four replicates of each size were established from separate shipped boxes of approximately 1,000 plants each.

It should be noted that the large crowns in each treatment were not a common feature. In each box of 1000 crowns large crowns represented probably 5-10% of the total numbers of plants.

Evaluations: Plants were measured for plant diameter early in the season, possibly on a monthly basis. Fruit yield, both count and weight of fruit from each replicate plot, were evaluated by harvest by qualified personnel harvesting on a regular schedule.

Statistical Analysis Reporting: Data were subjected to analyses of variance and mean separation at $p \leq 0.05$.

Results:

In year 1, plants of treatments planted to small crown sizes had smaller diameters than larger crowns one and a half months after transplant. Three months after transplant this difference had disappeared. There were no significant differences in plant diameters at any date in any size categories for the varieties tested in year 2.

Fruit production was significantly lower in smaller crowns of Aromas in the summer months of year 1, and resulted in lower total fruit production. None of the other treatments in either year realized any difference in production.

With very little exception did fruit size vary significantly between any of the treatments by month or through the season.

Year 1:

Means followed by the same letter do not significantly differ; P ≤ 0.05

Plant diameter in early season:
Aromas (in cm)

Treatment	January 14, 2005	March 9, 2005
Small	12.03b	21.69a
Large	13.07a	22.35a

Seascape (in cm)

Treatment	January 23, 2006	February 20, 2006
Slicks or "*Lisas*"	15.85a	24.16a
Small	18.11a	26.07a
Large	16.47a	27.63a

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In year 1, plants of treatments planted to small crown sizes had smaller diameters than larger crowns one and a half months after transplant.

Fruit production was significantly lower in smaller crowns of Aromas in the summer months of year 1, and resulted in lower total fruit production.

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Fruit Yield

Albion (in boxes/A)

Treatment	May	June	July	Aug	Sept	Oct	Total
Slicks	801.1a	874.2b	1044.6c	1060.1a	843.0a	501.1a	5124.1a
Small	628.8a	1115.8b	1266.1b	990.9a	876.8a	509.7a	5388.1a
Large	610.9a	1560.6a	1492.8a	1018.1a	952.1a	520.1a	6154.5a

Seascape (in boxes/A)

Treatment	May	June	July	Aug	Sept	Oct	Total
Slicks	1146.9a	1211.6a	1125.6a	826.0a	730.1a	411.1a	5451.3a
Small	1081.9a	1300.0a	1078.1a	790.7a	704.3a	394.0a	5349.0a
Large	1001.4a	1248.0a	1040.1a	736.5a	672.2a	377.4a	5075.6a

Fruit Size

Albion (g)

Treatment	May	June	July	Aug	Sept	Oct	Avg
Slicks	33.67a	23.82b	18.89b	24.39a	20.97a	18.93a	22.71a
Small	33.37a	27.80b	21.40a	23.56a	21.55a	18.93a	23.63a
Large	37.65a	26.08a	22.28a	23.35a	21.68a	19.01a	23.82a

Seascape (g)

Treatment	May	June	July	Aug	Sept	Oct	Avg
Slicks	28.74a	21.79a	17.62a	18.64a	17.38a	15.51a	20.02a
Small	25.27a	20.43a	17.72a	18.59a	17.14a	15.82a	19.38a
Large	21.62a	19.16a	17.38a	17.19a	16.88a	17.05a	18.40a

Transplant crown size was not a good predictor of strawberry fruit productivity in this study. In this two year study, only one treatment realized less total fruit production in the small diameter crowns.

Discussion: Transplant crown size was not a good predictor of strawberry fruit productivity in this study. In this two year study, only one treatment realized less total fruit production in the small diameter crowns. In fact, very small crowns, commonly known as slicks, while having some seasonal variation in productivity in the two varieties tested, did not have significantly lower fruit production than the next two larger sizes.

Appreciation: The researcher thanks Dan Schmida and his field crew of Beach Street Farms for their generous and unreserved cooperation in this study.

Slick" $\leq$ 0.9 cm $\geq$ 1.1 cm

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MONTEREY COUNTY

Crop Notes

November/December, 2007

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