PREHARVEST ANTITRANSPIRANT SPRAY ON CHERRIES

Antitranspirants (wax emulsions) have been evaluated for several years as orchard sprays to increase fruit size by reducing water stress in the tree. In earlier work with cherries *(California Agriculture,* August 1972) antitranspirant (AT) spray applied shortly before harvest substantially increased fruit size. However, more information was needed on the best spray concentration and timing to influence fruit size, yield, and soluble solids content. Further, no definitive tests had been conducted to evaluate the postharvest effects on fruit caused by preharvest AT application to the trees.

The tests reported here indicate that AT spray has beneficial effects on fruit size and on postharvest characteristics of the cherry fruit.

Part 1. Effect on Fruit Size

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The antitranspirant used in our 1971 cherry experiments was Mobileaf at 1:8 dilution (11 gal. per 100 gal. spray). In subsequent years (1972-74) the same material was tested further to determine the most effective time to apply the spray and the minimum concentration required for increasing fruit size.

In each year of the trials, the effect on fruit size was evaluated by measuring the diameter growth of the fruits. For each treatment four to six trees were randomly selected. Ten fruits, at about shoulder height around each tree, were tagged and their diameters were measured with a vernier caliper at weekly intervals. In 1973, the effect on fruit size was additionally evaluated by passing treated lots over a commercial grader to separate the fruits into different commercial sizes used in fresh shipping.

The diluted AT was usually sprayed with a back-pack mist blower at 300 gallons per acre. In 1973, other trees were sprayed with a commercial air-blast sprayer at the same rate.

1972. A time trial was conducted in which AT at 11 percent concentration was applied on April 21, April 28, May 5, or May 16 (respectively, 42, 35, 28, and 17 days before harvest) (graph 1). Also, a comparison of different rates was made by applying 11, 8, 6, and 5 percent AT on May 5, 28 days before harvest (graph 2).

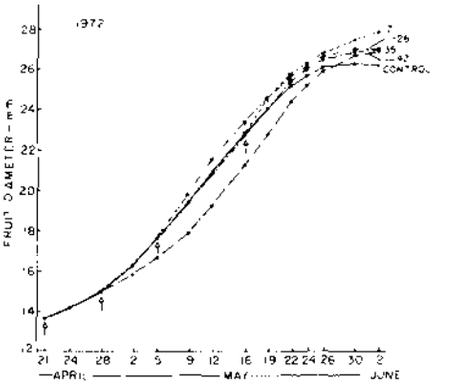
The time trial (graph 1) showed that all the AT treatments resulted in larger fruit than the control. When the AT was applied very early (42 days before harvest), fruit growth was temporarily depressed until several days before harvest. Then growth accelerated so that at harvest fruits on treated trees were larger than the controls. Treatments 28 days and closer to harvest showed an immediate growth acceleration after the AT application. The largest fruit occurred in the treatment applied closest to harvest (17 days before harvest). Unfortunately, AT was not applied closer to harvest to see if an application a few days before harvest would also be effective.

The concentration trial (graph 2) showed that it was not necessary to use the high rate of 11 percent AT. The 5 and 6 percent concentrations were at least as effective in increasing fruit size. Further, the lower concentrations caused least delay in fruit maturity, e.g., only a few days with the 5 percent spray, compared to over a week with the 11 percent spray. Also, the lower concentrations reduced fruit soluble solids the least.

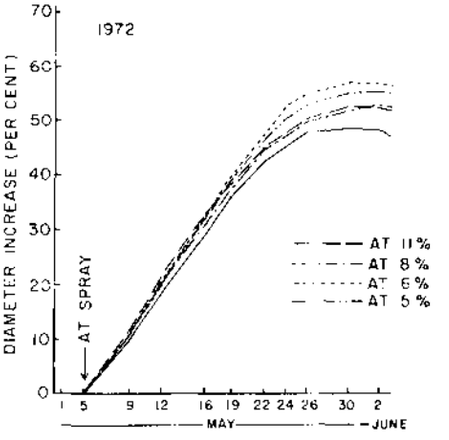
1973. Because the trials the previous year showed that 5 percent AT was just as effective as higher concentrations, a time trial was again conducted, using a 5 percent and a 2½ percent rate. This time the spray was applied closer to harvest than in 1972. Thus, sprays were applied on April 23, May 7, May 21, May 25, or May 29 (respectively, 39, 25, 11, 7, and 3 days before harvest).

The results (graph 3) showed again that when the AT (5 percent) was applied very early (about a week after beginning of pit hardening and 39 days before harvest) growth rate was temporarily depressed, presumably because of reduction in photosynthesis, since the AT not only reduces water loss

GRAPH 1. CHERRY FRUIT DIAMETER GROWTH AS AFFECTED BY AN 11 PERCENT ANTITRANSPIRANT SPRAY APPLIED 42, 35, 28, OR 17 DAYS BEFORE HARVEST.

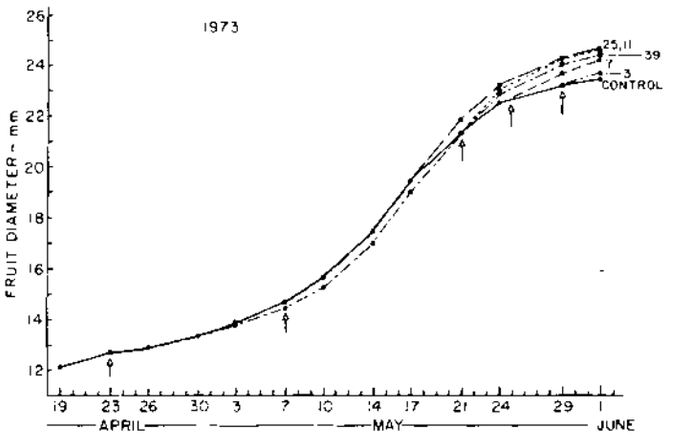


GRAPH 2. CHERRY FRUIT DIAMETER INCREASE RESULTING FROM DIFFERENT CONCENTRATIONS OF ANTITRANSPIRANT (AT) SPRAYS.

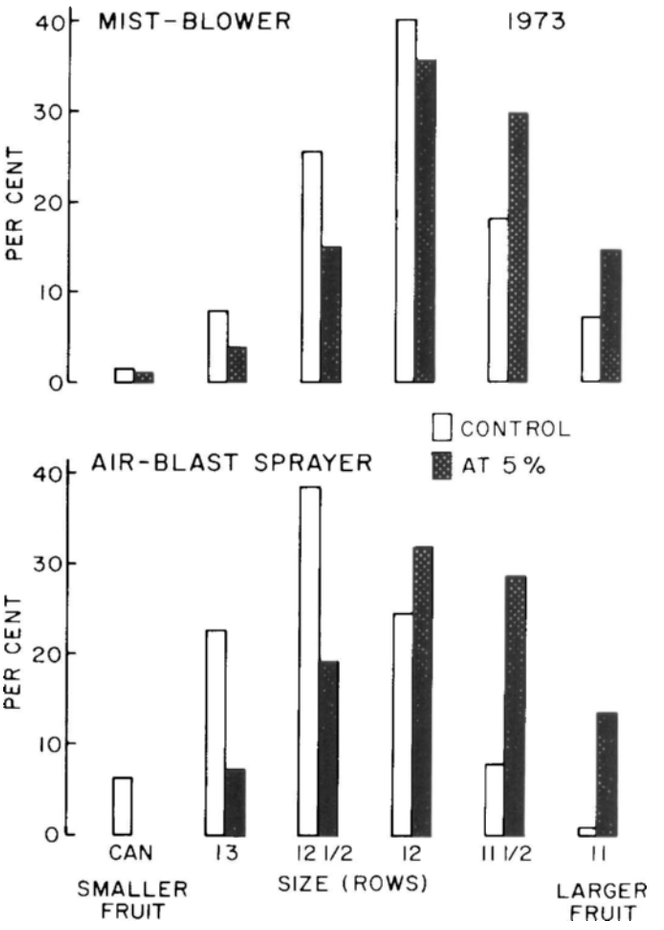


from the leaves but also retards the entry of carbon dioxide needed for photosynthesis. Nevertheless, at harvest, fruit on treated trees were larger than the controls. The greatest increase in final fruit size occurred with AT applications made 11 and 25 days before harvest. The 7-days-before-harvest treatment showed a slightly smaller, but nevertheless substantial, size increase. AT applied 3 days before harvest increased growth rate, but it was too close to harvest for any large increase in fruit size to occur.

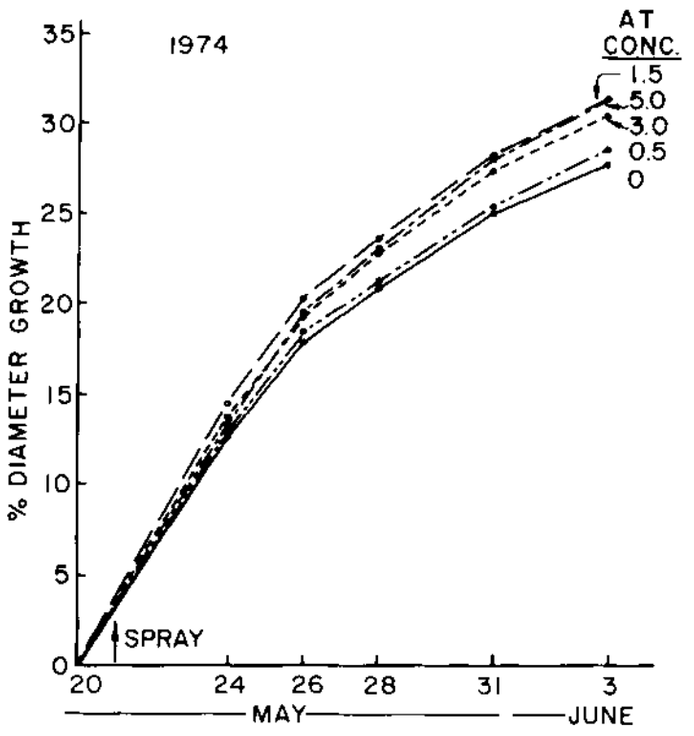
GRAPH 3. CHERRY FRUIT DIAMETER GROWTH AS AFFECTED BY A 5 PERCENT ANTITRANSPIRANT SPRAY APPLIED 39, 25, 11, 7, OR 3 DAYS BEFORE HARVEST



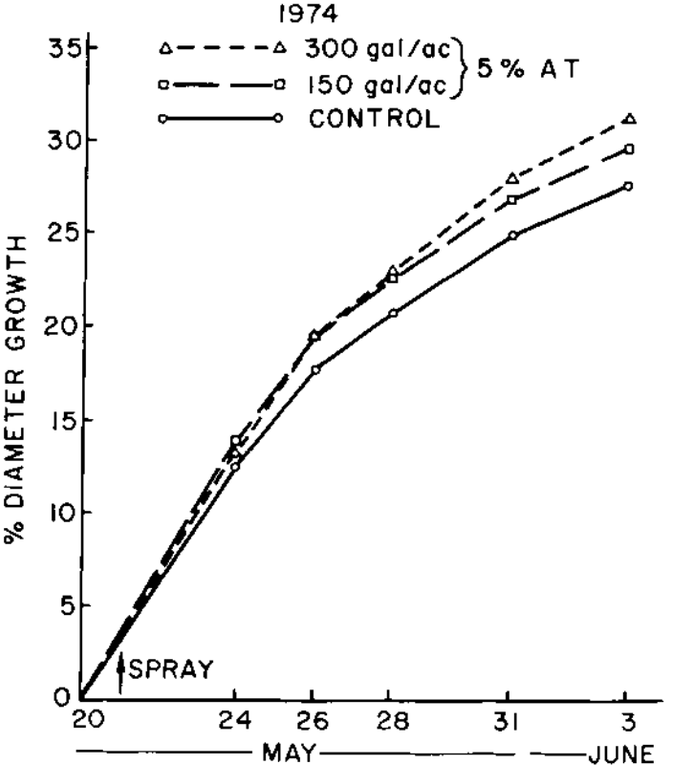
GRAPH 4. CHERRY FRUIT SIZE DISTRIBUTION RESULTING FROM A 5 PERCENT ANTITRANSPIRANT (AT) SPRAY, APPLIED BY A BACK-PACK MIST-BLOWER OR A COMMERCIAL AIR-BLAST SPRAYER.



GRAPH 5. CHERRY FRUIT DIAMETER INCREASE RESULTING FROM DIFFERENT CONCENTRATIONS OF ANTITRANSPIRANT (AT) SPRAYS APPLIED 13 DAYS BEFORE HARVEST.



GRAPH 6. CHERRY FRUIT DIAMETER INCREASE RESULTING FROM A 150- OR 300-GALLON-PER-ACRE APPLICATION RATE OF A 5 PERCENT ANTITRANSPIRANT (AT).



The 2½ percent AT time trial gave similar results, and the amount of fruit size increase was similar to that of the 5 percent AT trial.

Two lots of AT-treated fruit and their respective controls were run through a commercial grader to determine row-size distribution. One lot was from trees sprayed with 5 percent AT on May 21 using a back-pack mist blower, and the other was from trees sprayed with 5 percent AT on May 25 using a commercial air-blast sprayer. Graph 4 shows that in both lots distribution of fruit sizes in the AT-treated fruits was shifted towards the larger size so that, on the average, the AT-treated fruits had gained about half a row size.

1974. The 1972 and 1973 trials showed that a single application of AT, sprayed 3 weeks to 1 week before harvest, increased fruit size and that an AT concentration as low as 2½ percent was as effective as higher concentrations. The 1974 trial was aimed at determining the effect of even lower concentrations of AT when applied sometime within that period. Also, in this trial a food grade AT (Mobileaf FG) was used. AT sprays of 0.5, 1.5, 3, and 5 percent were applied on May 21, 13 days before harvest.

The lowest concentration, 0.5 percent, gave very little increase in fruit size but the 1.5, 3, and 5 percent rates all gave equally good size increases (graph 5).

A trial using 5 percent AT applied at 150 or 300 gallons per acre showed that the higher volume of spray per acre resulted in greater effectiveness of the AT, probably due to improved coverage by the spray (graph 6).

It can be concluded that this AT, at the rate of 2 to 3 percent dilution sprayed anytime between 10 to 20 days before harvest, can increase fruit size and therefore yield at harvest, and that effectiveness increases with improved spray coverage.

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PREHARVEST ANTITRANSPIRANT SPRAY ON CHERRIES

Part 2. Postharvest Fruit Benefits

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Tests were conducted during the 1973 and 1974 seasons to evaluate possible beneficial and detrimental effects of AT on postharvest handling of the cherry fruit. Included in these postharvest evaluations were effects of the AT spray on water loss from the fruit, subsequent fruit shrivel and stem browning, changes in respiratory pattern of the fruit, appearance, and any unusual deterioration pattern.

Methods

Trees were sprayed by either a small research back-pack mist sprayer or a commercial orchard

GRAPH 1. EFFECT OF TIMING AND CONCENTRATION OF PREHARVEST ANTITRANSPIRANT SPRAY ON POSTHARVEST WEIGHT LOSS OF BING CHERRY FRUIT. WEIGHT LOSS OF TREATED FRUIT IS SHOWN AS PERCENT OF CONTROL — THUS THE LOWER VALUES REPRESENT THE GREATEST WEIGHT LOSS REDUCTION.