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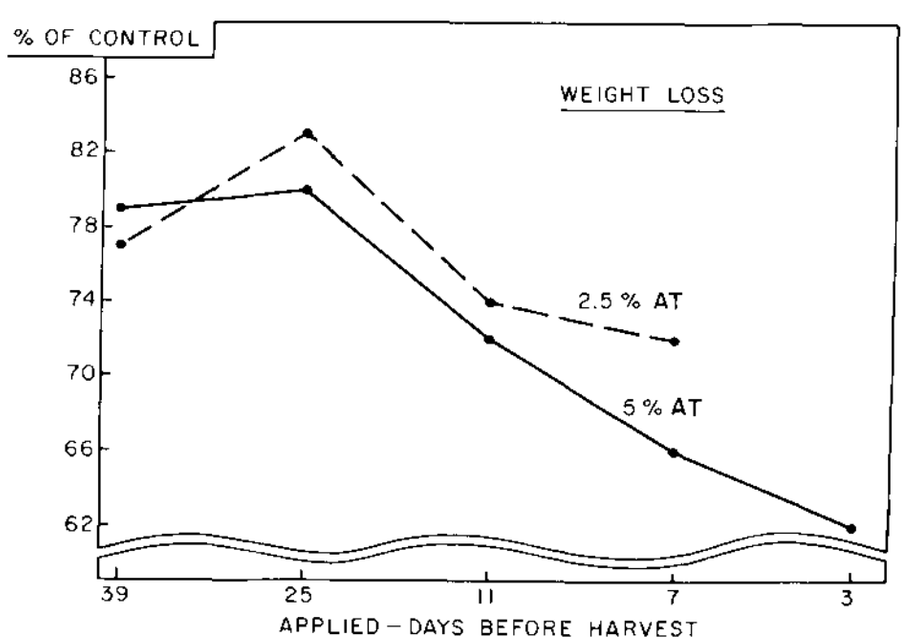
Tests were conducted during the 1973 and 1974 seasons to evaluate possible beneficial and detrimental effects of AT on postharvest handling of the cherry fruit. Included in these postharvest evaluations were effects of the AT spray on water loss from the fruit, subsequent fruit shrivel and stem browning,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

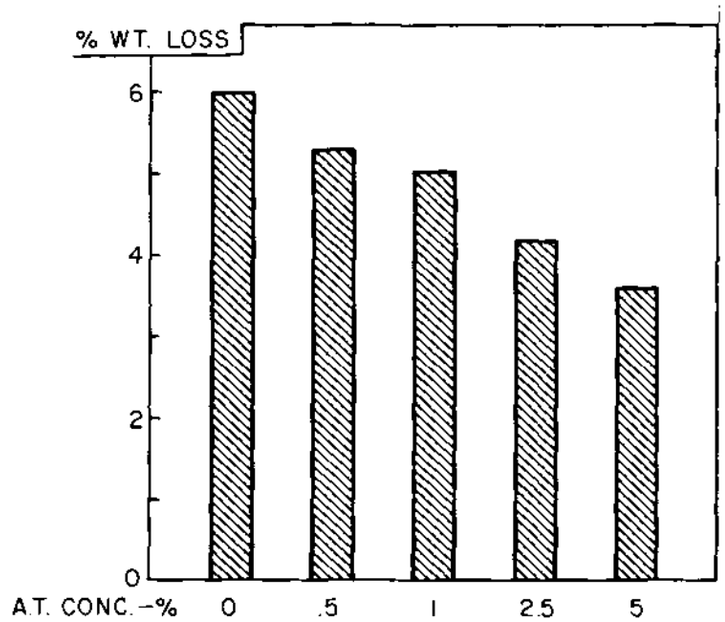
GRAPH 1. EFFECT OF TIMING AND CONCENTRATION OF PREHARVEST ANTITRANSPIRANT SPRAY ON POSTHARVEST WEIGHT LOSS OF BING CHERRY FRUIT. WEIGHT LOSS OF TREATED FRUIT IS SHOWN AS PERCENT OF CONTROL — THUS THE LOWER VALUES REPRESENT THE GREATEST WEIGHT LOSS REDUCTION.



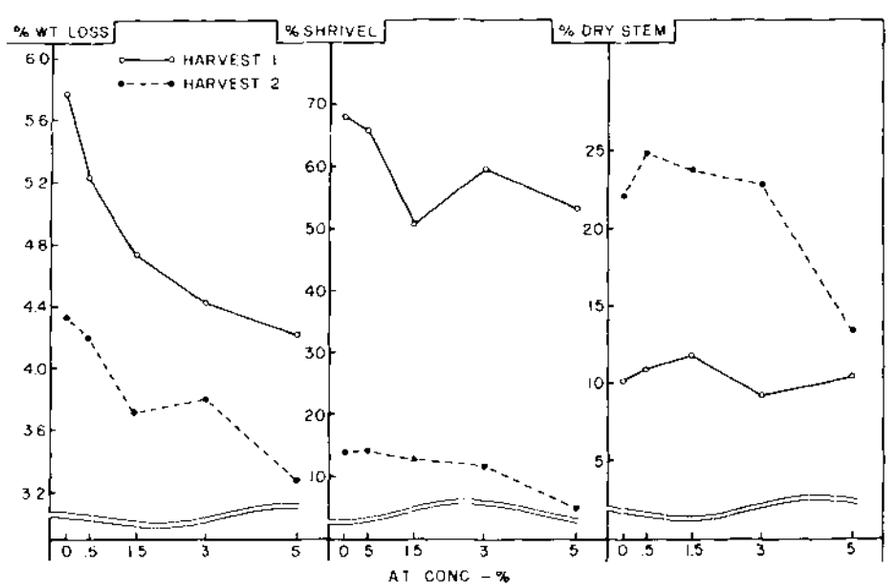
sprayer. Time of application was from 39 days to 3 days before harvest (Bing cherry requires about 60 days from full bloom to harvest maturity), and concentrations varied from 0.5 to 5 percent AT. A food-grade formulation of the antitranspirant, Mobileaf (Mobil Chemical Co.), was used in these tests. Fruit was harvested from individual tree replicates, protected from excessive warming, and transported to Davis as soon as possible after harvest.

Weight loss was measured by two methods: fruit was placed at 68°F (20°C) and 60 percent RH for 24 hours under high air flow (about 15 cfm/lb. fruit) for maximum stress; and fruit was placed at 41°F (5°C) and 90 percent RH for 7 days without direct air flow past the fruit. Fruit held at 41°F was evaluated visually for shrivel and stem browning.

GRAPH 2. EFFECT OF PREHARVEST ANTITRANSPIRANT SPRAY CONCENTRATION ON POSTHARVEST WEIGHT LOSS OF EARLY BURLAT CHERRY FRUIT.



GRAPH 3. EFFECT OF TIME OF HARVEST ON POSTHARVEST WEIGHT LOSS, FRUIT SHRIVEL, AND STEM DRYING OF BING CHERRIES SPRAYED BEFORE HARVEST WITH VARIOUS CONCENTRATIONS OF ANTITRANSPIRANT.



Results

Overall, the AT reduced weight loss about one-third and substantially reduced visible fruit shrivel and stem browning. Of great importance was the effect of AT in reducing water loss immediately after harvest — the time when fruit frequently is at relatively high temperatures and low RH and is particularly susceptible to substantial water loss. Orchard-applied AT is the only available means of preventing water loss between harvest and packing.

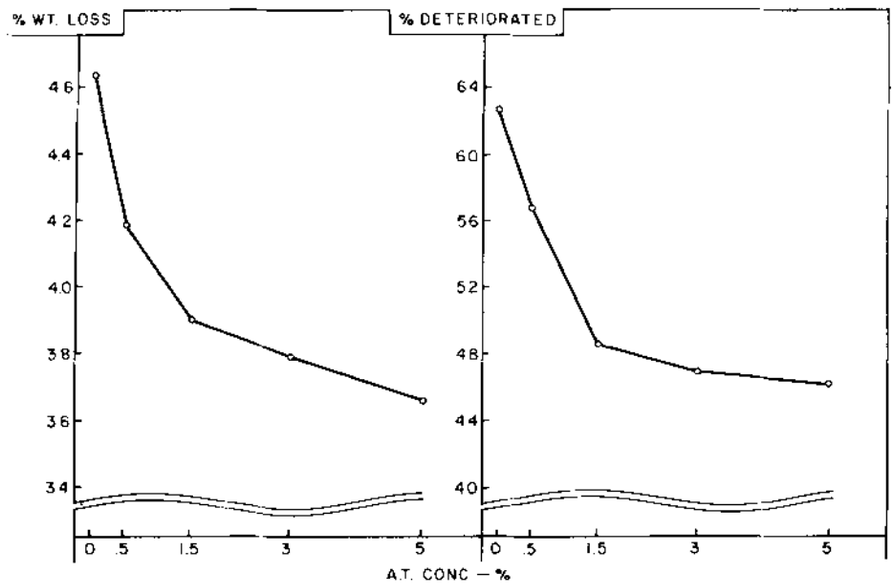
Timing of AT spray. Greatest effect in reducing postharvest weight loss occurred with applications near the time of harvest (graph 1). However, even when applied 39 days preharvest, the AT material reduced postharvest weight loss by 20 percent. Application of AT about 1 to 2 weeks preharvest, to coincide with maximum fruit sizing and minimum soluble solids effects, should result in about one-third less weight loss than in nonsprayed fruit.

Concentration of AT spray. A preliminary test with Early Burlat cherry (graph 2) indicated increasing effectiveness with increasing AT concentrations between 0.5 and 5 percent. A subsequent series of tests with Bing indicated the same relationship, with the early harvest fruit showing greater weight loss than the late harvest fruit (graph 3). The relative reduction in weight loss was similar for both harvests, about 25 percent reduction with the 5 percent AT treatment.

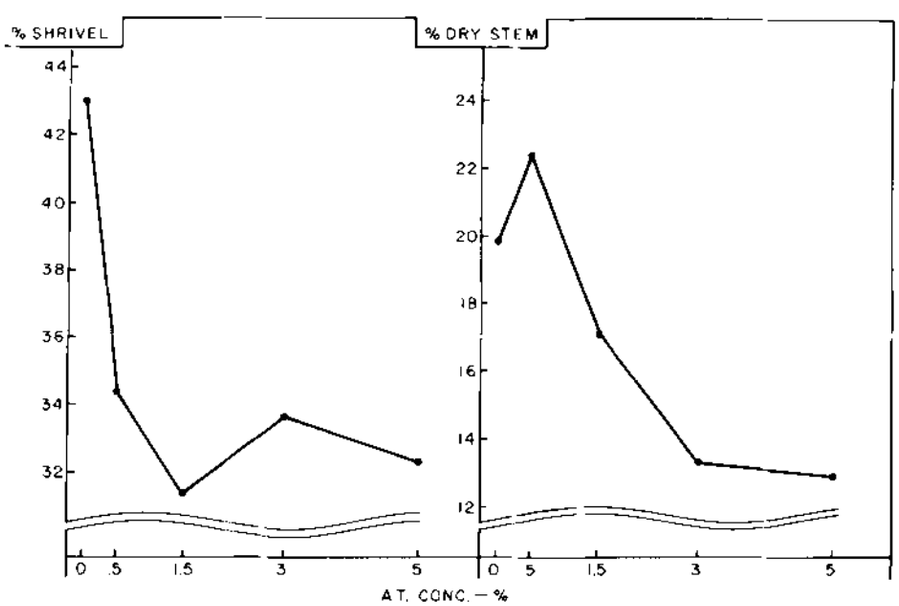
The effect of the AT treatment in reducing fruit shrivel was not as great in this test as in others, but shrivel was correlated closely with weight loss measurements. Shrivel was serious in early-harvested fruit; much less serious in late-harvested fruit.

Stem browning was influenced by the AT treatment only in the late harvest fruit, where the higher AT concentrations showed as much as 50 percent reduction in stem browning. While the early harvest fruit showed no effect from the AT treatments, the levels of stem

GRAPH 4 EFFECT OF PREHARVEST ANTITRANSPIRANT SPRAY CONCENTRATION ON POSTHARVEST WEIGHT LOSS AND DETERIORATION OF BING CHERRY FRUITS, ALL 1974 TESTS.



GRAPH 5. EFFECT OF PREHARVEST ANTITRANSPIRANT SPRAY CONCENTRATION ON POSTHARVEST FRUIT SHRIVEL AND STEM DRYING OF BING CHERRY FRUITS, ALL 1974 TESTS.



browning were quite low.

Time of harvest. The relationships between early and late harvest fruit in weight loss, fruit shrivel, and stem browning (shown for one 1974 test in graph 3) were consistent among all tests during the 1973 and 1974 seasons. The less rapid weight loss and lower incidence of fruit shrivel in late season fruit may be from a greater development of natural fruit waxes during the final maturity stage on the tree. The greater incidence of stem browning late in the season might result from either greater stress on the stems prior to harvest or from a partial abscission between fruit and stem before harvest.

Packing line tests. During both seasons, some fruit samples were evaluated after commercial packing to identify any possible packing problems or benefits associated with the AT treatments. An apparent beneficial effect of AT in reducing packing line injury to the fruit was observed in 1973 but not in 1974. Fruit treated with 5 percent AT showed visible dulling, but this was judged to be not objectionable. There was no apparent dulling or other differences in appearance of fruit treated with AT at concentrations below 5 percent.

Overall effect. A compilation of data from all tests conducted during 1974 (graphs 4 and 5) shows an overall benefit of around 20 percent reduction in weight loss and 25 percent reduction in total deterioration (fruit shrivel and stem browning). The greatest effect on fruit shrivel was achieved with about 1.5 percent AT, whereas the greatest effect in reducing stem drying required about 3 percent AT. This difference may be due to the difficulty of achieving sufficient AT deposit on the very small stem surface as compared to the much larger fruit surface.

Conclusions

A preharvest AT spray on cherry trees has important beneficial postharvest effects. These include reduced water loss, fruit shrivel, and stem browning. These benefits are possible with an AT spray applied 1 to 2 weeks preharvest at a concentration of 2 to 3 percent. Within this concentration range there was no detrimental effect on fruit appearance. The AT treatment has the very important benefit of protecting the fruit from water loss during the delay between harvest and packing, a period when the most severe conditions usually are encountered. The AT treatment showed no detrimental effect on the packing operation. These postharvest benefits of a preharvest AT spray are in addition to the already demonstrated benefits of greater fruit size and increased yield.

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