Packing Nectarines
TO REDUCE SHRIVEL

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Precise weight measurements were recorded for each test box of nectarines prior to shipment to terminal market.

Moisture barriers to limit the movement of water vapor from the fruit may effectively reduce shrivel in nectarines during packing and shipment, if used to supplement good handling methods.

DURING RECENT YEARS nectarine shrivel has become recognized as an important marketing problem. If shrivel develops during handling, storage, or distribution, it can seriously reduce the sales appeal of the fruit. These tests were designed to study ways of preventing the development of shrivel under a wide range of conditions and in all stages of marketing.

Shrivel is caused by water loss from the fruit. In early stages the fruit becomes dull and flabby, and ultimately shows visual shrivel. The fruit then becomes loose in the packed container, making it more susceptible to transit injury. Shrivel becomes visible in nectarines with a weight loss of 4 to 5%. The methods tested to reduce shrivel involved the use of several materials as barriers to the movement of water vapor from the fruit. A parallel study, undertaken to determine the effect of storage management—particularly air velocity and relative humidity—in reducing shrivel, was reported in *California Agriculture*, April, 1963.

Under current marketing procedures the fruit may be subject to a variety of environmental conditions as it moves from orchard to the packer, to cooler, to storage, and on through transportation and warehousing before reaching the retailer. For maximum benefit the treatment must be capable of protecting the fruit from water loss at all of these stages of marketing.

Waxes and liners

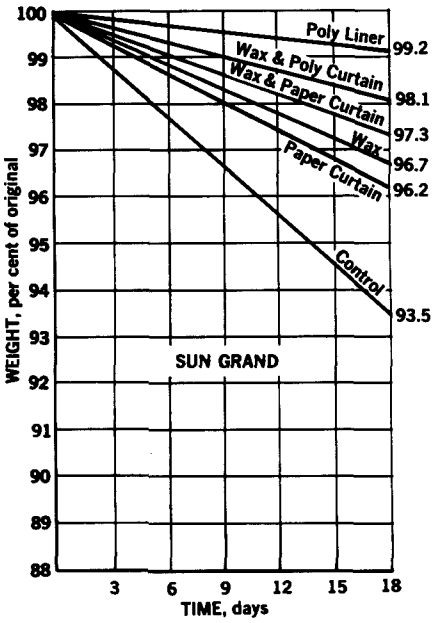
Waxes are in commercial use for some fruits, including nectarines, as a means of improving appearance and reducing shrivel. Vented polyethylene liners have also been used in reducing shrivel. The use of a polyethylene liner increases the problems of decay control, however, since it provides an essentially saturated atmosphere around the fruit. Other observations have indicated that some modification of the polyethylene liner might provide adequate control.

During 1962 a series of trials were conducted on several varieties comparing commercial waxing, paper and polyethylene curtains over the tops of containers and vented polyethylene liners. All of the commercial waxes used in these tests contained a fungicide. When vented polyethylene liners were used with unwaxed fruit, the fruit was also treated with a fungicide before packing. In all cases, commercially packed fruit was used. Where the fruit was packed in plastic trays, weights were taken separately of the top and bottom tray of the container. The cup pack and plastic tray pack were compared in some tests. In all cases, fruit was separated from the container before weighing, since containers have been shown to increase in weight during storage.

Trials with two early season nectarine varieties, Early Sun Grand and Early Le-Grand, indicated that the various treatments tested would have an effect on water loss and might prevent the onset of shrivel during normal marketing periods. A test shipment was conducted later with Sun Grand nectarines, placed under treatment in California, and evaluated in Milwaukee after normal handling and transit. Several combinations of wax paper, polyethylene curtains and liners were tested. Results for Sun Grand, in terms of per cent of original weight following transit, are shown on the graph. Under transit conditions the weight loss was somewhat more rapid than was found with earlier varieties held under constant storage conditions in California.

Shrivel

Shrivel was severe enough in the control lot to reduce sale possibilities. The only treatments which showed no shrivel were those in which polyethylene was used. The fruit in the vented polyethylene liners was brighter and more turgid than fruit in any other treatment.



A final series of tests was made with Gold King, a late season storage variety. Because this variety is commonly stored. it is frequently subjected to shrivel-producing conditions. Since paper curtains had not proven sufficiently effective in earlier tests, they were not included. During the 48-day tests the control lost over 10% of its original weight (see graph). Fruit in either polyethylene curtains or vented polyethylene liners showed no shrivel. Waxing the fruit in addition to the other treatments showed little added benefit.

Top comparisons

Only the fruit in the top layer of the containers was compared in the results reported here. More direct exposure to air movement causes this to be the area with the most severe shrivel problem. Without treatment, the weight loss of fruit in the bottom layer was approximately 50% less than for the top layer. The bottom layer may require treatment to reduce weight loss even though it does not lose as much as the top layer. A curtain has no effect on weight loss of the bottom layer unless it is wrapped down under the bottom tray of the box, however.

The weight loss of nectarines when packed in paper cups or in plastic trays was compared at different air velocities and relative humidities, as shown on the graph, using the Early LeGrand variety. By moving 100 feet of air per minute past the lug box, the use of plastic trays in place of paper cups appeared as effective as a 10% increase in relative humidity. Actually, the average weight loss for the combined top and bottom layers of nectarines in paper cups was greater than the weight loss of the top layer of the tray pack. Possible differences in rate of cooling between cups and trays were not evaluated.

No single treatment was found to apply under all conditions in these trials. Packing methods, cooling and storage management, holding periods and distance from market, plus other considerations not yet evaluated, would affect a decision on the best treatment. Further work is needed on the effect of these treatments on cooling rate, flavor, and length of storage. While these treatments may delay the onset of shrivel, other considerations will still limit the effective storage life of the fruit.

The treatments described here may be useful supplements, but none can be considered a substitute for proper handling through the various marketing channels. When used in addition to other good practices, however, they may significantly improve the appearance and marketability of nectarines. The use of these moisture barriers may also require the application of a fungicide.

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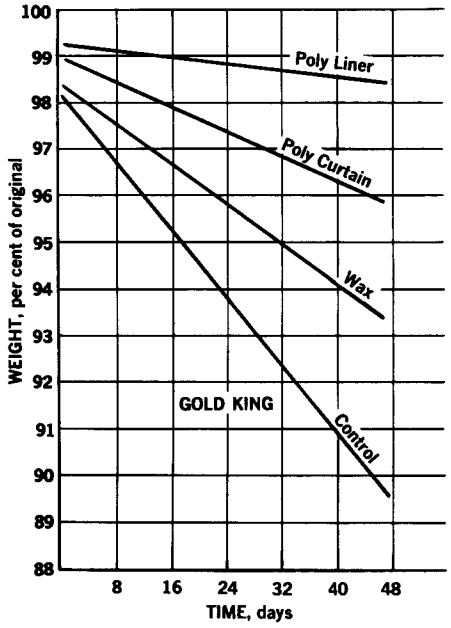

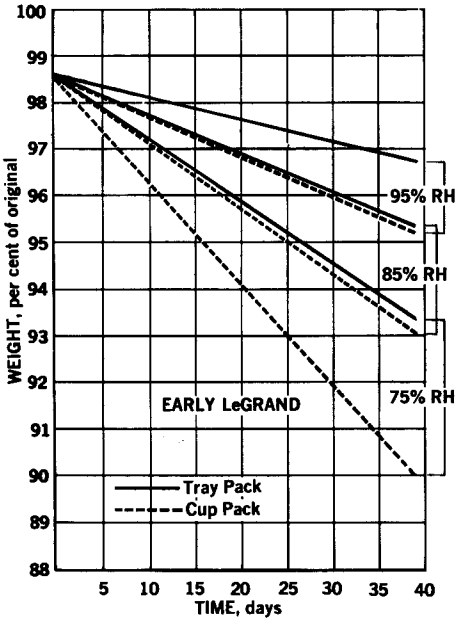

GUIDES TO VALUE OF NONIONIC WETTING AGENTS

WETTING AGENTS have been found to be effective in increasing water intake by nonwettable soils. Because these materials are being sold under many trade names and with a rather wide range in cost, consumers should consider certain economic factors in making a choice.

The most important factor to consider in the purchase of wetting agents is the percentage of active material contained in the product. Some "trade name" products contain 100% active ingredients, whereas others will contain only a few per cent.

Tests conducted with various "trade name" nonionic wetting agents indicated that there was little difference between them in effectiveness when compared on a unit-active-ingredient basis. In other words, if product A was 100% active and product B was 50% active, product A gave similar results to product B when A was diluted with twice as much water as B. Twice as much could be paid per gallon of product A than product B.

Some products appeared to be slightly superior or inferior to others even when based upon a unit concentration basis. However, because the exact molecular structure of the product is not divulged by the producers—and the material may be altered periodically and still sold under the same "trade name"—the most reliable index presently available is still the amount of active material being purchased.

Often wetting agents are being incorporated and sold with other products such as liquid nutrients. Purchasers must then calculate the value of the nutrients and the wetting agent separately to determine whether it is more economical to purchase them separately or in combination.

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