Lemon Storage

pre-storage treatment reduces black buttons, decay, delays fruit aging

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The keeping quality of lemons—during and after storage—can be improved by pre-storage treatment with the growth regulators 2,4-D—2,4-dichlorophenoxyacetic acid—or 2,4,5-T—2,4,5-tricholophenoxyacetic acid.

In lemon packing houses where a water-wax emulsion is applied to the fruit prior to storage the 2,4-D or 2,4,5-T should be added to the wax emulsion.

If a water-wax emulsion is not used, then a separate treatment must follow the final fresh water rinse of the fruit. Such a treatment should flush a growth regulator solution over the fruit and recirculate the surplus or apply a very fine spray of growth regulator to the fruit and not recirculate the small surplus. The amount of growth regulator adhering to the fruit would be about the same in either case, so no change in concentration would be necessary.

Benefits that may be derived from using either of these growth regulators are in the form of *1*, a reduced number of black buttons, *2*, a reduced amount of decay, and *3*, a delay in the aging of the fruit.

The extent of benefits will vary with each set of circumstances but in general they are greater in cases of prolonged storage. In several lots of silver and light green fruit stored for four and six months, the average percentage of black buttons in the nontreated fruit was 26% as compared with 2% in treated fruit. In the same lots nontreated fruit had an average of 4.9% decay as compared with 0.7% decay in treated fruit.

Lemons stored for the normal time for various color grades and then packed and held for two weeks at refrigerator car temperatures followed by three weeks of storage at uncontrolled warehouse temperatures showed an average of 17% black buttons for control fruit and 3% for the treated fruit. The same fruit had 7.4% decay in the control lots and 6.0% in the treated lots. The benefits that are readily apparent in the packing house appear to carry over into the post-storage period while the lemons are in packed boxes.

The benefits due to a delayed aging of the fruit are less readily evident. However, the green fruit turns yellow more slowly and yellow fruit becomes bronzed more slowly.

The use of 2,4-D or 2,4,5-T in the packing house treatment of lemons has not affected the quality of the juice. Because of the delay in changes in green lemons during storage there tends to be a delay in curing with the result that juice availability may be slightly retarded. The use of growth regulators has not appeared to have a serious effect on anaerobic breakdown. Further studies on this problem are in progress.

Lemons may be treated with 2,4-D or 2,4,5-T in the packing house even though a growth regulator spray has been used in the orchard. Such double treatment has given better control of black buttons than has either treatment separately. Orchard applications alone of 2,4-D or 2,4,5-T have not given satisfactory control of black buttons in packing house storage of lemons.

Either 2,4-D at 500 ppm—parts per million—or 2,4,5-T at 200 ppm may be used for treating the lemons going into storage. Tests during the past two years have indicated that 2,4,5-T is probably as safe for general use as is 2,4-D. However, from an examination of many boxes of fruit treated with each of these growth regulators it has appeared that the 2,4,5-T may be somewhat more effective in preserving the lemons.

No advantage of one ester or mixture of esters over others has been observed. Ester formulations are preferred to amine formulations because the former are volatile and leave no residue on the surface of the fruit.

Under certain circumstances which seem to be related to the use of chromates in the air-washer, 2,4-D and 2,4,5-T are not compatible with nitrogen trichloride, as used for control of decay. Rind injury appearing as reddish or brownish discoloration has been greatly intensified by these growth regulators in some packing houses using nitrogen trichloride. Its use, with a growth regulator in the wax solution, should be with extreme caution or avoided.

When a minimum storage period is desired it would be a disadvantage to use 2,4-D or 2,4,5-T because of the delay in changing to a yellow color. 2,4,5-T delays the change in color somewhat longer than does 2,4-D. Also, the percentage of juice may not increase as rapidly.

Late summer use of 2,4-D or 2,4,5-T in the packing house may necessitate more careful culling for weak fruit—blossom-end decline—because of the retention of green buttons in such fruit. Ordinarily, a black button or missing button aids in identifying weak fruit.

Solutions or emulsions of 2,4-D or 2,4,5-T can cause extreme injury or death to sensitive plants. Disposal of these materials should be in a sump rather than down a drain so as to avoid contamination of underground water supplies.

Untested products or formulations should not be used in pre-storage treatment of lemons.

Light green lemons after 6 months storage; *left*, control; *right*, 200 ppm 2,4,5-T added to the wax emulsion at the time of washing the fruit.

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