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TITLE: Effect of storage temperature and carbon dioxide level on decay and mass loss of Anjou pear fruit

PERSONNEL: P. G. Sanderson, D. L. Fuller, WSTFRC, Wenatchee, WA

JUSTIFICATION

Winter pear packers in Washington have expressed the need to hold fruit in bins so that they can respond to market demands for speciality packs after the usual packing season is over (late December). Fruit scuffing increases with duration of storage and has been associated with shrivel (desiccation). Storage at temperatures above freezing should reduce water loss in stored fruit because less water would be expected to be removed from the air as ice on refrigeration coils.

Although there are many reports of injury to apples occurring in storage due to high CO₂, apples stored in CA with up to 5% CO₂ for 9 mo showed little difference in taste or other quality measurements (Drake, 1996). In addition, substantial cost savings can be realized from allowing higher CO₂ levels to build in CA storage as scrubber efficiency is greater at high CO₂ levels than at lower levels. However, pithy brown core has been reported in pears held at 3% CO₂. The following tests are proposed to determine the effects of storage regimes, which are being developed to prolong the packing life of fruit and reduce storage costs, on decay and mass loss of Anjou pear fruit.

PROGRESS

OBJECTIVES

- Determine the effect of storage temperature and elevated CO₂ on decay resulting from natural inoculum on untreated fruit,
- Quantify mass loss (shrivel) of fruit stored in bins in different storage regimes.

PROCEDURES:

Decay. To determine the effects of temperature and CO₂ on decay, 6 bins of fruit, 3 from each of 2 grower lots, were placed in each of 4 rooms at the Stemilt RCA facility with different atmosphere temperature combinations. Atmospheres were either 1.0% or 3.0% CO₂ at temperatures of either 31 F or 34 F. Oxygen was kept at 1.5% in all rooms. Fruit were put into the rooms directly from the field and no postharvest fungicides were applied. Decay in each bin was assessed after about 150 days in storage.

Mass loss. To assess the effects of temperature and CO₂ on mass loss, 30 fruit from each bin were weighed and placed in mesh bags. Bags then were placed in the middle of each bin so that at least 2 fruit covered the surface of the bag. Bags were reweighed after about 150 days of storage.

RESULTS AND DISCUSSION

Decay. Gray mold incidence was significantly affected by storage temperature ($P=0.002$), but not by the level of CO_2 ($P=0.276$). Twice as many fruit were rotted per bin in fruit kept at 34 F (85 fruit/bin) compared to those stored at 31 F (43 fruit/bin). Incidence of decay by other fungi was not affected by storage treatments.

Mass loss. Temperature and CO_2 levels differentially affected the amount of weight lost over the storage period ($P=0.010$). As expected, fruit held at 31 F lost more weight in storage than did fruit held at 34 F. Unexpectedly, however, significantly more weight was lost in fruit kept at 31 F and 3.0% CO_2 (3.2% of weight lost) than in any of the other storage regimes including 31 F and 1.0% CO_2 . Fruit held at 31 F and 1.0% CO_2 did lose significantly more weight (2.7% of weight lost) than fruit held at 34 F at either 1.0% or 3.0% CO_2 (2.2% of weight lost, each). The reason for the increased loss of weight in fruit held at 31 F and 3.0% CO_2 over that kept at 31 F and 1.0% CO_2 is unclear.

ANTICIPATED BENEFITS

This study will assess risks that may accompany long term storage of Anjou pear fruit in field bins at temperatures and in atmospheres and that are being developed for this purpose.

LITERATURE CITED

Drake, S. R. 1996. Controlled atmosphere storage of Delicious apples in high carbon dioxide. Proc. 12th Ann. Postharvest Conf. Washington State Horticultural Assoc., Wenatchee, WA pp. 85-92.