

PROGRESS REPORT

PROJECT NO: ARS - 863

TITLE: Improved storage quality of winter pears with the use of controlled atmosphere

YEAR INITIATED: 1993-1994 **CURRENT YEAR:** 1998-1999

TERMINATING YEAR: 1997-1998

PERSONNEL: Stephen R. Drake, Research Horticulturist
USDA, ARS, PWA, Wenatchee, WA

REPORTING PERIOD: 1997-1998

JUSTIFICATION:

Information now being used to store pears in CA was developed over 20 years ago. Many of the warehouses storing pears today have much newer equipment capable of better control and earlier establishment of CA.

Using modern CA storage procedures, conditions can be established, maintained and manipulated to maintain pear quality in long- and short-term storage. Recent research has suggested that CA environments may be manipulated to reduce costs and enhance pear quality. Increased production of Anjou, Bosc and Bartlett pears will require information on proper storage for the best market quality possible using new CA procedures.

OBJECTIVES:

1. Determine type and time of atmosphere establishment in conjunction with different maturity levels to optimize long-term storage quality of Anjou, Bosc and Bartlett pears.
2. Determine maturity indicators, other than firmness, that will aid in the prediction of time of harvest for long-term storage of Bosc pears.
3. Determine the feasibility of irradiation as a quarantine treatment of Anjou and Bosc pears and fruit quality that can be expected from pears irradiated before and after cold storage.

PROGRESS:

'Anjou'

1. Use of new semi-commercial controlled atmosphere storage units at Stemilt. Four CA room at the new Stemilt facility were used for this study. Pears were obtained from 4 warehouses and 2 grower lots/warehouses and subjected to CA conditions of 31 or 34 F combined with a purge or static atmosphere. No differences in fruit quality were noted for purge or static atmospheres, but this treatment should be repeated for a second year. The storage of pears at 34 F greatly reduced shrivel, but did not enhance the number of rots. Other quality factors (firmness, SS, and TA) were not influenced by storage temperature. Pears stored at 31 F were greener after storage than pears stored at 34 F. Quality evaluation by QC people from the participating warehouses, determined that pears stored at 31 F were superior in finish to pears stored at 34 F. Darken skin discoloration and speckled skin were not influenced by storage temperature or type of atmosphere.
2. Irradiation as a quarantine treatment. Anjou pears can be irradiated at doses sufficient to meet quarantine requirements (<300gy's). Anjou pears ripen normally regardless of irradiation dose. There is a possibility of an additional 1 to 2 days of shelf-life with Anjou pears exposed to an irradiation dose of >300 gy's. If irradiation doses at 600 gy's or above are required in the future quality problems will result in the form of excessive scald.
3. Pithy brown core and its relationship to controlled atmosphere storage. This study is presently in storage and results will be determined after storage. To-date this study indicates that PBC is not the result of improper storage, but improper CA storage does enhance the appearance of this disorder. PBC is initiated in the field and is probably related to a nutrient imbalance.

'Bosc'

1. Controlled atmosphere storage. Pears were harvested weekly starting in early August and continuing through Sept. This is the third year of this study and firmness coupled with either soluble solids or acid content are the best indicators of proper maturity for long-term storage. Bosc pears are very tolerant to various CA conditions. The results of

the 1996 crop agree very closely with past years results. Bosc pears can be exposed to CO₂ at levels up to 5% with no quality problems. Regardless of the different atmospheres, pears stored for 8 months ripened normally. No internal disorders were associated with high CO₂. Finish and rots were similar between treatments. The data for all years (3) of this study is presently being compiled and will be submitted in a written format in the near future.

2. Irradiation as a quarantine treatment. Bosc pears can be exposed to irradiation doses of 900 gy's or less with little quality problems. Some loss of firmness is apparent at doses above 600 gy's, but not to the extent to cause serious quality problems. Scald is not a problem with irradiated Bosc pears and no loss of finish or disorders were enhanced with the use of irradiation at doses of 900 gy's or less.

PUBLICATIONS:

Drake, S.R., P.G. Sanderson and L.G. Neven. 1998. Response of apple and winter pear fruit quality to irradiation as a quarantine treatment. HortScience (submitted).

Drake, S.R. and T.A. Eisele. 1997. Quality of 'Gala' apples as influenced by harvest maturity, storage atmosphere and concomitant storage with 'Bartlett' pears. J. Food Qual. 20:41-51.

Drake, S.R. 1997. Controlled atmosphere storage of apples and pears. Tree Fruit Postharvest J. 1:12-18.

Neven, L., D. Purdue and S. Drake. 1998. Cell wall B-galactosidase in ripening Anjou pears. J. Food Qual (accepted).

Raese, T.J. and S.R. Drake 1997. Calcium sprays, harvest and storage influence fruit quality of Anjou pears. Good Fruit Grower 48:70-73.

BUDGET:

1. Requested for 1998-1999: \$0