PROJECT NO: 8892 Terminating Report

TITLE: Attempting to Predict Requirements for Scald Control of "Delicious" Apples (Washington)

YEAR INITIATED: 1995-96 **CURRENT YEAR:** 1998-99
TERMINATING YEAR: 1999

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JUSTIFICATION:

During the past three years I have collaborated with Drs. Bill Bramlage and Sarah Weis on this project to determine if apple scald potential and/or DPA use can be predicted from preharvest ambient measurements and/or harvest maturity indices. If the actual need for DPA treatment can be reliably predicted in a user-friendly procedure, unnecessary DPA treatment can be avoided. This will reduce costs, avoid unnecessary waste disposal, and minimize the residue present on fruit after storage. Results to date suggest that no DPA may be required in many cases, thus increasing market potential for these fruit. It is particularly important to clarify the potential use of these predictive models for CA storage, since this is how much of the Delicious crop is stored.

OBJECTIVES:

1. To use three years of data from WA to construct a model similar to that constructed from MA data.

2. To test both the WA and MA models to predict scald development and DPA requirement in both WA and MA.

3. To test delays in imposition of CA conditions on scald development in CA at two different atmosphere (2.8%0_2, 2%$C0_2$ in MA, 1.5%0_2, 1% $C0_2$ in WA).

PROCEDURES:

1. Use the data from the past three years collected in WA to construct a WA scald-prediction model, using the procedures developed by Dr. Weis to construct the MA model. This model will predict whether a lot of fruit has high, medium, or low scald susceptibility and whether 2000, 1000, 500, or zero DPA is needed to control scald in storage.

2. Delicious fruit from two or more locations in both MA and WA will be harvested on two or more dates, drenched with different DPA concentrations, and stored for 25 weeks in 32^0F. After seven days at 70^0F, scald will be recorded and compared with its predicted occurrence using both the MA and WA models.

3. Samples from two harvests at two sites will be stored in CA (32^0F, 2.8%0_2, and 2%$C0_2$ in MA). A parallel set of samples from one of these sites will be air-freighted to Wenatchee to be stored in CA there, along with WA samples. After 25 weeks of CA plus one week at 70^0F, scald will be recorded and compared with predicted occurrences using both the WA and MA models. (Thus, effectiveness of these models in predicting both scald severity and DPA requirement will be tested in air and in two CA storage atmospheres.)

PROGRESS:

1995-1998

In Massachusetts (MA) historical data was used to construct a model that predicted scald severity on Delicious after air storage. During the past three years they tested this model and found that it not only predicted scald but also identified the concentration

of DPA needed for its control in air storage. The model was effective for Delicious grown throughout New England and can be used easily by storage operators under field conditions. Parallel tests in Washington (WA) in 1996 indicated that this model also was effective for fruit from several WA sites. Intuitively, however, it is reasonable to expect that better results would result from use of a predictive model built from WA data than from one built from MA data. Until now we have not had sufficient WA data to construct such a model, but I have collected three years of data that now allows us to build a WA model and test it against the MA model under both WA and MA conditions. In these studies air storage was used because the historical data from which the model was built, were for air-stored fruit. In 1997-98 we extended these studies to include CA storage of MA Delicious in both MA (2.8%0_2, 2% $C0_2$) and in WA (1.5 %0_2, 1%$C0_2$). Results showed that scald developed in CA on highly susceptible fruit at both sites, but on moderately susceptible fruit, scald developed only in the CA atmosphere in Massachusetts. This latter result could be due to the difference in CA atmosphere at the two locations, or to the greater delay between harvest and storage in MA than in WA (20 vs. 13 days after harvest). Both of these factors are important CA variables, and how important they are in affecting accuracy of scald prediction deserves resolution.

Overall, only ambient temperature was important in scald prediction. We hoped that at least one of the maturity indices such as starch clearing index would be of value to confer a maturity aspect to the prediction.

1995-1999

Analysis in progress to be presented at the TFRC meeting July 19, 1999.