

DEVELOPING AND TESTING OF A MODEL TO RAPIDLY PREDICT APPLE THINNER RESPONSE

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ABSTRACT

Thinning is the most important activity that an orchardist is required to do since it influences the crop the year of application through its effect on fruit quantity and quality and the following year through its effect on return bloom. Consequently, an appropriate level of thinning is required to assure consistent production of high quality fruit. Over the past several years we have done many experiments to test the hypothesis that monitoring fruit growth may be an important and accurate method to predict final fruit set following thinner application.

Currently, there is no system in place to allow orchardists to accurately assess fruit set until it is too late to thin. Usually it is not possible to determine if a fruit will drop until the thinning window of opportunity has passed. In a year with normal temperatures, fruit that will abscise start to slow growth 3 to 4 days after thinner application. By 7 days after application it is possible to measure the reduction in growth and make a prediction of drop even though abscission may not occur until 2 to 3 weeks later. By measuring individual fruit we are able to detect even small reductions in fruit growth which allow us to predict which fruit and how many fruit will abscise early enough that supplemental thinners may be applied if deemed necessary. The generalized procedure involves tagging 70 to 100 spurs on 4 to 5 trees at the 7 to 8 mm stage. Individual fruit in a cluster are marked and measured prior to thinner application and then measured at 2 to 3 days intervals. Two key things that must be adhered to are: fruit must be measured at the same point on the equator of the fruit and growth of individual fruit must be identified so that growth rate of the fruit may be calculated. Fruit are predicted to abscise if their growth rate slows to 50% or more of the growth rate of the 20 fastest growing fruit that are being measured. Ideally we would like to make a prediction of the number of fruit that will abscise within 7 days of thinner application, if not earlier. Based upon our experience over the past few years temperature following application is the dominant factor influencing thinner response thus determining when an accurate prediction of abscission can be made. It appears that trees must be exposed to 120 to 130 heating degree units (base 50° F) before a prediction can be made. In cool years exposure to this number of heat units may require up to 12 days. This does not appear to be a problem since the thinning window of opportunity will be lengthened because of these cooler temperatures.

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The accuracy of this system has routinely been above 90% and in some years and situations accuracy approaches 100%. We are currently working on a spread sheet data entry system where automatic calculations will be made and an answers related to the predicted fruit set will be available within minutes of the time data is entered or downloaded from a computer.