

Title: Extending Cornell Carbohydrate Model to Pennsylvania Growers for Determining Apple Tree Response to Chemical Thinners.

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Duration: March 1, 2020 – February 29, 2021

Justification: Variability and unpredictability in chemical thinning of apples has been a problem for growers since the introduction of the operation. Interactions of environment at the time of application, application method and coverage and drying conditions have led to less than consistent responses to thinners. Possibly more important and an overriding factor is the sensitivity of the tree itself to the chemical thinners applied. Environmental factors that affect the tree physiology are temperature and sunlight and their impact upon carbohydrate supply (photosynthesis). Carbohydrate production is driven by two main environmental conditions; temperature and light. High nighttime temperatures and low daytime light levels reduce carbohydrate accumulation; whereas cool night temperatures and high sunlight results in abundant accumulation of carbohydrates. The combined effects of these two factors on carbohydrate production has been hard to predict. A carbohydrate production simulation model has been tested and refined over a number of years to help explain trees response to chemical thinners. The theory is that during periods of carbohydrate deficits (carbohydrate production is less than carbohydrate demand for growth) trees are more responsive to chemical thinners and vice-versa when production exceeds demand. In multiple year trials Research has suggested that during periods of prolonged carbohydrate deficits (> 4 days) excessive thinning response may occur. While shorter periods of deficits (1 to 2 days) did not induce excessive thinning. Multiple articles in the Fruit Times Newsletter have been posted during the critical thinning window for a number of years. The main purpose of those articles was to familiarize growers with the capabilities of the MaluSim model.

While these have been valuable the most accurate method is for individual growers to check the model the day before or morning of their intent to make an application of thinners. The NEWA system also can provide pest forecasts for potential for pesticide applications to common disease and insects. Therefore, we are proposing that the SHAP Extension Committee take control of paying the annual membership fee for access to the NEWA system for all fruit growers across the state.

Methods: Currently there are 23 weather sites that NEWA weather data is available. Eleven of those sites are orchard sites with on-site RainWise weather monitoring system. Results of the model would be posted every 3 to 4 days on the Fruit Times Newsletter site which is immediately sent electronically to all subscribers. Growers can go directly to the

closest site to their location and look at the results themselves. In order for growers across the state to access this system it is necessary for SHAP to pay an annual fee to NEWA.

Rather than running this grant through Penn State, as done in the past, I am suggesting that the Extension committee take over paying the annual membership fee for as long as they feel they are receiving a benefit from this service. Currently that annual fee is \$1,750. With this fee they would have access to all the services offered by the NEWA system. Those services can be viewed by going to www.newa.cornell.edu This would streamline the process and reduce the need for submitting an annual proposal. This would also eliminate the redundant paperwork by the Extension Committee, the College of Agricultural Sciences and Penn State Administrative services.

Budget

NEWA membership fee for FY 2020

\$1,750