



Date: 1/16/2019

PSU Ref. No: 206525

Title: Extending Cornell Carbohydrate Model to Pennsylvania Growers for Determining Apple Tree Response to Chemical Thinners for 2019

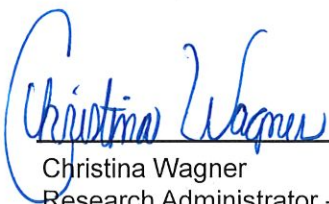
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Proposed Project **2/15/2019 - 2/14/2019** **Total Project Request: \$3,255**

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Please reference PSU Ref. Number in all correspondence.

Title: Extending Cornell Carbohydrate Model to Pennsylvania Growers for Determining Apple Tree Response to Chemical Thinners for 2019

Personnel: Rob Crassweller Department of Plant Science, Penn State University. **Phone** 814-863-6163. Email: rmc7@psu.edu

Duration: February 15, 2019 – February 14, 2020

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, 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 night time temperatures and low daytime light levels reduce carbohydrate production; whereas cool night temperatures and high sunlight results in abundant production of carbohydrates. The combined effects of these two factors on carbohydrate production has been hard to predict. 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 Robinson & Lakso (2011) showed that during periods of prolonged carbohydrate deficits (> 4 days) resulted in intense thinning. While shorter periods of deficits (1 to 2 days) did not have intense thinning. In 2018 the model was run based on weather data was monitored and posted in the Fruit Times Newsletter from 12 sites. There are actually 25 total weather stations that contribute to the NEWA weather data collection in Pennsylvania.

Methods: Currently we have 12 orchard sites that have an on-site RainWise weather monitoring system. We have access to three instruments located at airports whose weather readings are adjusted for distortion due to airport runways. The station located at the airport in Martinsburg (listed as Altoona) is immediately adjacent to a commercial orchard. Results of the model would be posted periodically on the Fruit Times Newsletter site which can be sent electronically to all subscribers. However, growers can go directly to the closest weather station to their location and look at the results themselves on a daily basis, if desired and recommended. The real value of this system lies in encouraging growers to check the system themselves the morning of, or afternoon before, deciding on making a thinner application. This year we will attempt to train the growers to check the system on their own since each of their circumstances (cultivar x rootstock, growth stage and materials used) will be different

Budget

Miscellaneous

NEWA membership fee

\$1,750

Replacement of RainWise AgroMet Weather

\$1,505

Station **Total**

\$3,255