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PSU Ref. No: 199586

Title: Extending Cornell Carbohydrate Model to Pennsylvania Growers for Determining Apple Tree Response to Chemical Thinners for 2018

Submitted to: Patti Keller

patti@acnursery.com

State Horticultural Association of Pennsylvania

Submitted by: Robert Crassweller

814-863-6163

rnc7@psu.edu

Proposed Project Period: 03/01/2018 - 01/31/2019 **Total Project Request:** \$2,770

AUTHORIZED UNIVERSITY OFFICIAL

Diane Rudy DATE *1/23/18*

Diane Rudy
Research Administrator - Pre-award
College of Agricultural Sciences
107 Agricultural Administration Building
University Park, PA 16802-2602
Tel: 814-865-5419
Fax: 814-865-0323
Email: L-AG-contgrts@lists.psu.edu

John W. Hanold DATE *1/23/18*

John W. Hanold
Assoc. VP for Resresearch
Office of Sponsored Programs
The Pennsylvania State University
110 Technology Center Building
University Park, PA 16802-2602
Tel: 814-865-1372
Fax: 814-865-3377
Email: osp@psu.edu

EIN: 24-60000376

DUNS No: 00-340-3953

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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 2018

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

Duration: March 1, 2018 – January 31, 2019

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 2017 the model was run based on weather data was monitored and posted in the Fruit Times Newsletter from 9 sites. There are actually 25 total weather stations that contribute to the NEWA weather data collection in Pennsylvania.

Methods: Currently we have 14 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. The real value of this system lies in encouraging the growers to check the system themselves the morning of, or afternoon before, deciding on making a thinning 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

NEWA membership fee	\$1,750
Wages @ \$10.50/hour x 15 hours/week x 6 weeks	\$945
Fringe 7.9%	\$75

**Fringe benefits are computed using the fixed rates of 41.60% applicable to Category I Salaries, 15.40% applicable to Category II Graduate Assistants, 7.90% applicable to Category III Salaries and Wages, 0.10% applicable to Category IV Student Wages, and 26.30% for Category V, Postdoctoral Scholars and Fellows, for fiscal year 2018 (July 1, 2017, through June 30, 2018). If this proposal is funded, the rates quoted above shall, at the time of funding, be subject to adjustment for any period subsequent to June 30, 2018, if superseding Government approved rates have been established. Fringe benefit rates are negotiated and approved by the Office of Naval Research, Penn State's cognizant federal agency.*

Total	\$2,770
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