Northern New York Agricultural Development Program
2015 Project Report: CONCLUSIONS

Precision Crop Load, Irrigation and Harvest Management to Optimize Fruit Size and Quality of NNY Apples

Conclusions/Outcomes/Impacts:

The sequential sprays provided excellent crop load control. The apple carbohydrate model served as a guide to let growers know whether or not to spray, how much to spray, and what days to avoid spraying. However, the fruit growth rate model has been the best method to physically assess, in a more precise way, thinning efficacy. Combining the use of both models in the Precision Thinning program is a useful tool to optimize crop load and fruit size to improve profitability.

The comprehensive concept of precision thinning, sometimes viewed as too complex or as requiring too much work, involves substantial effort by the individual fruit grower. Our goal is to demonstrate to growers that the potential income involved is substantial enough to so justify this intensive effort to manage crop load in a very precise manner.

We are proposing for the near future the development of a smartphone app to facilitate measurements and provide growers with results in real-time for more timely response and application. As part of this project and with investment of additional funding, we purchased Bluetooth digital calipers to have the fruit measurements sent directly to a smartphone, however, we still need an specific app to be able to organize and analyze the data.

Economic Implications of Water Deficit

Considering the irrigation trial results from the Hudson Valley orchard site on its 5th leaf, we can estimate a loss of 235 bu/ha (1,117 trees/acre) or 414 bu/ha in a high density orchard as in Orleans (1,980 trees/acre). In terms of crop value, the lack of irrigation showed a loss of 3,859 $/ha – 6,809 $/ha depending on orchard density. Usually, when the crop is light, there can be some stress with little effect, but when the crop is heavy any stress has a stronger effect. This extrapolation indicates how water deficit could affect the new high-density orchard plantings in Northern New York.

Losses due to tree water stress could even be worst for full productive orchards and late varieties with a longer growing season such as Fuji.

Further research is needed regarding how the stress observed in 2015 will affect return bloom and growth in 2016, and how a drier summer can affect yield and fruit size in other areas like Northern and Western New York.

Outreach:

In February 2015, we began the project with a presentation of the concepts of precision orchard thinning for growers at the Northern NY Fruit School.

Grower recommendations developed through this project were disseminated through the Cornell Extension educators, including regional newsletters, publications and meetings. Some information was used in real-time as it developed during the crop load management window (thinning and drought periods). This timely information was disseminated through emails and Extension educators, in the NY Fruit Quarterly magazine sent to all tree fruit growers in the state, and in grower newsletters at various times during the season.

We made presentations on this project at the following events where NNY growers were present:

- 2/15/16: Northeastern New York Commercial Tree Fruit School: Francescatto, P. 2016. "PGR Strategies for Improving Production Practices"
- 2/15/16: Northeastern New York Commercial Tree Fruit School: Lordan, J. "Precision Management: How and Why We Should Irrigate"
- Jan. 2016: 2016 Empire State Producers Expo, Syracuse, N: Francescatto, P. and T.L. Robinson. Precision Chemical Thinning of Honeycrisp and Gala
- 5/28/15: 2015 Champlain Valley Thinning Meeting: T. L. Robinson
- 5/26/15: 2015 Annual Capital District Thinning Meeting: T. L. Robinson
- 4/29/15: WeBex Workshop: Robinson, T.L. 2015. "Precision Crop load Management Workshop"
- 3/3/15: Champlain Valley Fruit School: Robinson, T.L. 2015. "Winter pruning demonstration"
- 2/9/15: Northeastern NY Commercial Tree Fruit School: Robinson, T.L. 2015. "Precision Orchard Management - Research Updates."

Next Steps:

This project will require several years of effort to extend the precision thinning and irrigation concept to apple growers in Northern NY. We hope to continue to improve these models and our protocol on how to manage crop load such that we can avoid any over thinning. We plan to continue this effort with the support of the NNYADP.

Acknowledgments:

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Reports and/or articles in which results of this project have been published.

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Robinson, T.L., J. Lordan, D. Dragoni, A.N. Lakso, and P. Francescatto. 2015d. Precision irrigation management of apple with an apple-specific Penman-Monteith model. VIII International Symposium on Irrigation of Horticultural Crops, Lleida, Spain.
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