



Canadian Agri-Science Cluster for Horticulture 2

Progress Report April 2016

Activity 3, Apple 2

Improving Tree Fruit Storage Management Using Weather Based Predictions of Fruit Quality at Harvest

Lead Researcher

Gaétan Bourgeois, PhD, Agriculture and Agri-Food Canada

Collaborators

Jennifer DeEll, PhD, Ontario Ministry of Agriculture, Food and Rural Affairs

Denise Neilsen, PhD, Agriculture and Agri-Food Canada

Activity Objectives

- Create an inventory of data from the industry and previous projects on apple fruit quality at harvest (i.e. firmness, soluble solids content, starch index, internal ethylene concentration and/or titratable acidity) and physiological storage disorders after harvest of major cultivars;
- Acquire additional data on apple fruit quality and physiological storage disorders of major cultivars;
- Evaluate existing bioclimatic models of apple fruit quality and physiological storage disorders and develop/update additional ones;
- Implement the bioclimatic models in the weather-based computer system CIPRA (Computer Centre for Agricultural Pest Forecasting) in order to provide timely information and to obtain rapid feedback from the apple fruit industry.

This research consists in a first part, in the analysis of levels of plant growth regulators (PGRs) and xylem functionality during the season, both known to be involved in bitter pit development. PGRs and xylem data are to be compared to bitter pit incidence (BPI) at harvest after storage. The second part involves the analysis of accumulated BPI and weather data over several years to attempt developing a BPI risk prediction model. These objectives are based on the hypothesis that PGRs, xylem functionality loss and weather all have an important role in the development of bitter pit and that further research on these factors are required to eventually alleviate losses associated to bitter pit on apples.

Evaluation of bioclimatic models: No new evaluation of bioclimatic models was conducted during 2015.

Bioclimatic model implementation: Bioclimatic models to predict apple firmness in 'McIntosh' and risks of vascular browning in storage are already implemented in CIPRA. Soon, risk prediction models for soft scald and soggy breakdown in 'Honeycrisp' will also be integrated in CIPRA after a few modifications. These changes will allow evaluating risks on a more scalable manner throughout the growing season.

Extension Activities

The following scientific article was submitted and accepted for publication in the scientific journal **HortScience**: "Modelling the effect of preharvest weather condition on the incidence of soggy breakdown in 'Honeycrisp' apples." Some changes will be made to respond to comments and corrections suggested.

Early Outcomes (if any) or Challenges

The inventory of fruit quality data highlighted the existing variability between orchards and within orchards and therefore the difficulty to develop fruit quality predictive models. A different approach is being evaluated to overcome that variability.

One of the coming challenges in the project is to develop a generic modelling approach to express earlier in the season the risk for apples of developing storage disorders (e.g. soggy breakdown, soft scald, bitter pit, etc.) and to give an earlier prediction of firmness of apples.

Key Message(s)

In this project, bioclimatic models of apple quality at harvest and in storage will be updated or developed based on historical data and on new information obtained during the project. All models will be integrated in the CIPRA (Computer Centre for Agricultural Pest Forecasting) software and made available to the Canadian apple industry.

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