



Apple Crop Load Management: Enhancing Thinning Predictability and Tree Response Through Advancements in Modelling, New Precision Thinning Products and Strategies, and Technology



LEAD RESEARCHER

John A. Cline
Professor of tree fruit physiology
at the University of Guelph

Fruit trees produce many flowers and fruits which need to be removed from the tree early in the spring for fruit to adequately size and to ensure the trees produce fruit the next year. This process, called thinning, is an orchard practice growers use to improve profitability and fruit quality. This research activity aims to thin flowers or fruits using special chemical thinners and new technologies.

The thinning practices used by growers currently can be imprecise and labour-intensive. Thinning creates up to 124 hours of work per hectare and accounts for 38 per cent of total labour costs annually (based on 2023 production and labour rates in Ontario).

This research activity will provide new strategies and product recommendations for apple crop load adjustment. This will lead to significant labour savings, improved fruit quality and a higher percentage of marketable fruit. Decision support systems will also be provided for producers to boost crop load management and explore artificial-intelligence-based computer vision systems for measuring key indicators of crop load, thus improving management outcomes.

This research activity will begin in 2024–25, with more information to come in the next report.

KEY TAKEAWAYS:

- Greater economic and environmental sustainability for fruit tree operations.
- Higher quality fruit production.
- Estimated labour savings of 25 per cent compared to hand-thinning.
- Increased orchard profitability by 10 per cent per hectare due to improved fruit quality.
- Better ability to estimate yields early in the growing season.
- Improved flowering and more consistent annual cropping.



TOP: Fruits that have dropped to the ground naturally or in response to specialized chemicals early during fruit development.

ABOVE: A heavy crop load of Gala apples at harvest time, these apples are too small to market and sell for fresh market consumption.

Photo credits: John Cline

- Recommendations for thinning apples using metamitron and 1-ACC, alone and in combination with 6-BA.
- Improved understanding of how chemical thinners impact labour savings, crop returns and risks of mummified fruit due to black rot fungal infections.
- Crop load optimization models for profitability maximization.
- Recommendations for using computer models to increase thinning efficacy and outcomes.

