Canadian Agri-Science Cluster for Horticulture 2

Progress Report April 2016

Activity 4, Apple 3

Performance of Honeycrisp on New Size-Controlling Rootstocks

Lead Researcher

John A. Cline, PhD, University of Guelph

Collaborator

John Zandstra, University of Guelph, Ridgetown Campus

Activity Objectives

1) Measure the precocity and performance of new size-controlling rootstocks and to compare these against the industry standards M.9 and M.26

2) Determine rootstock effects on calcium disorders, whole tree physiology, and fruit storage potential (Zandstra)

3) Assess the productivity of more vigorous rootstocks M.106 and M.7 against M.26 – with a close examination of graft union compatibility (Cline)

Research Progress to Date

Due to a spring frost in 2015, preliminary yield and fruit quality assessment of 'Honeycrisp' on 17 different rootstocks was not possible. Rootstock effects on tree growth and vigor continue to be monitored. A data collection protocol similar to that used in 2015 will be used to assess rootstock effects on tree growth, survival, and productivity. Barring any weather-related issues, the following data will be collected during the 2016 season: 1) total number of root suckers per tree; 2) trunk circumference in the fall; 3) tree status at the end of the growing season, and;; 4) total yield and number of fruit per tree.

'Honeycrisp' is prone to forming a weak union at the graft interface. A preliminary study was conducted in 2015 to determine whether measuring total phenolic compounds above and below the union of trees grafted on four rootstocks (M.9, M.26, B.9, and P.I.80) could be used to detect graft compatibility or incompatibility in this cultivar. Bark and wood samples, collected from trees late in the summer, were prepared and extracted and their total phenolic contents were determined.

Extension Activities

None to report

Early Outcomes (if any) or Challenges

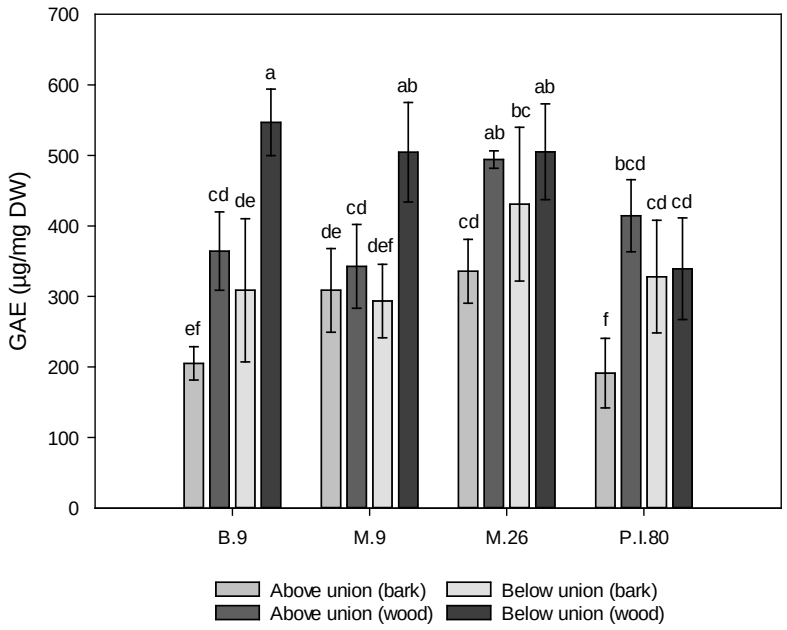

Figure 1. Total phenolic content, expressed as GAE (µg/mg DW), of bark and wood samples collected above and below the graft union of 'Honeycrisp' trees grafted on B.9, M.9, M.26, and P.I.80 rootstocks. All data are expressed as means ±SEM (n=5). Bars with the same letter are not significantly different according to Duncan's multiple range test at P=0.05.

For all 'Honeycrisp'/rootstock samples analyzed, there were no clear patterns in the levels of total phenolics [expressed as GAE (µg/mg DW)] either below or above the union, or between bark and wood samples (Figure 1). Furthermore, there was significant variation among replicate trees on the same rootstock, explaining the high standard error intervals observed in Figure 1. Trees in this preliminary study were between 8 and 14 years old. This advanced age may have influenced the high variation in results obtained during this analysis. Although this study failed to detect measureable differences in the total phenolic concentration above and below the union of 'Honeycrisp' scions grafted on M.9, M.26, B.9, and P.I.80 rootstocks, an effective protocol for extracting soluble phenolics from bark and wood was established. It is postulated that analyses of graft unions from younger trees (<2 years old) could provide further insight into the use of phenolic compounds to detect graft incompatibility in 'Honeycrisp'.

Key Message(s)

A number of new, size-controlling rootstocks are being tested at the Simcoe research station. Rootstock effects on tree growth, fruit size, and productivity, will continue to be assessed in 2016.

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