2017 Data Collection Protocol for the 2014 NC-140 Apple Rootstock Trial

Revision November 9, 2016

Revision History

Nov 7, 2016	Draft protocol proposed at 2016 Annual Meeting in State College, PA. Circulated to all participants.

Data Coordinator:
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Rootstocks

Honeycrisp

- 15 Total: B.10, G.11, G.202, G.214, G.30, G.41, G.5890, G.935, G.969, M.26 EMLA, M.9 T337, V.1 (USA Only), V.5, V.6, V.7

Fuji (Aztec)

- 14 Total: same as Honeycrisp excluding G.5890

Tree Spacing and Land Requirement

Honeycrisp

- spacing 4.0 ft x 12 ft (1.22 m x 3.66 m) 2240 trees/ha (907 trees/acre)
- A total of ~150 trees/site (+ guard trees at beginning and end of each row

Aztec Fuji

- spacing 5 ft X 13 ft (1.52 m X 3.96 m) 1661 trees/ha (672 trees/acre)
- A total of ~140 trees/site (+ guard trees at beginning and end of each row)

The 2014 Apple rootstock trial was established in the spring of 2014 with:

- 13 cooperators receiving 'Honeycrisp' scions
- 7 cooperators receiving 'Aztec Fuji' scions

Experimental Design:

- At each location the experimental design is a completely randomized design with 10 single tree replications

Orchard Management for 2017:

1. Allow the trees to flower and fruit
2. Fertilize trees as per local recommendations.
3. Since both Honeycrisp and Fuji are biennial, it is important to thin early. Local recommendations can be adapted. Some will want to thin at bloom using a lime Sulphur fish-oil spray. Others will want to thin at petal fall or the 10 mm stage. Assuming crop load is not compromise by frost or cold weather, chemically thin, and then followup with hand thinning after fruit set.

4. For both cultivars, after fruit set single fruit clusters and hand thin to appropriate levels of crop load (Honeycrisp – 4 fruit/cm^2; Fuji - 5 fruit/cm^2 to ensure regular annual cropping and adequate fruit size. Calculate a crop load target for each tree based on the previous fall's trunk cross sectional area.
5. Prune and train according to tall spindle protocol (see below)

Locations of Plantings

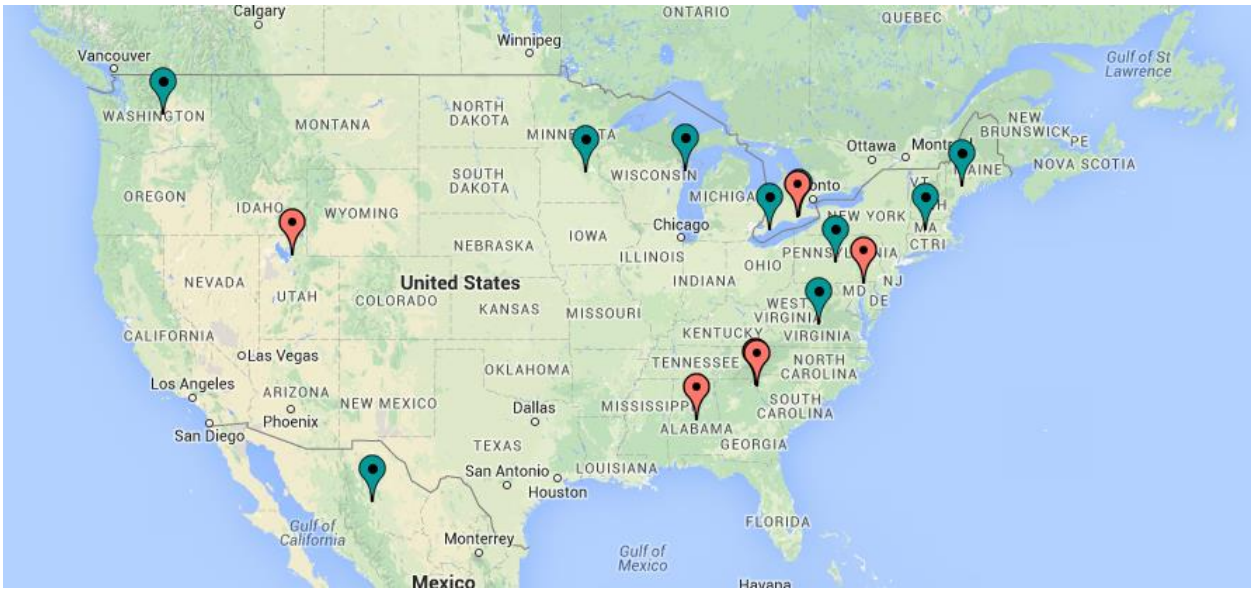

Figure 1. Location of participants of the 2014 NC-140 Apple rootstock planting evaluation of 'Aztec Fuji' (red) and 'Honeycrisp' (teal) in Canada, the United States, and Mexico. Map updated as of Nov 10, 2014 (not all participants included). For an updated interactive map visit http://bit.ly/1zv3wCc

Location	Fuji	Honeycrisp	Location	Fuji	Honeycrisp
Alabama	✔		New Jersey	✔	✔
Idaho	✔	✔ (partial)	New York		✔
Indiana		✔	Ontario - Ridgetown		✔
Massachusetts		✔	Ontario - Simcoe	✔	✔
Maine		✔ (partial)	Pennsylvania	✔ (Partial)	✔ (Partial)
Mexico		✔ (partial)	South Carolina	✔	
Michigan		✔	Utah	✔	
Minnesota		✔	Virginia		✔
Georgia	✔		Washington		✔
			Wisconsin		X
Totals	3	7		4	8

Data measurements for second year (2017)

Please use the Excel Data Template Spreadsheet Provided for 2017. This is located at www.nc140.org-> nc-140 members->Rootstock Plantings->2014 NC-140 Apple Rootstock->Protocols->2017->

Column	Details	Units
1	Observation Number	NA
2	State or Province (select from drop-down list)	NA
3	Cultivar (Honeycrisp or Fuji)	NA
4	Tree Row (optional)	
5	Tree Number (optional)	
6	Rootstock (see Excel template – select from drop-down list)	NA
7	Replication (1, 2, 3, or 4)	NA
8	Date of full bloom	DD/mm/yy
9	Fall trunk circumference (Fall 2017) measured 30cm above graft union (same location as previous years)	Cm
10	Tree status/survival at end of 2017 growing season 0=died after it was clearly growing well ; 1=alive 2= considered to be a non-data tree because of human error (mechanical injury) 3=tree broke at the union	Number
11	Total yield (kg/tree) in 2017	Kg
12	Total fruit number (total number of fruit/tree) – in 2017	No.
13	Total root suckers per tree (fall 2017)	No.
14	Harvest date	DD/mm/yy

Bitterpit on Honeycrisp

There was some discussion at the 2016 NC-140 meetings about quantifying the amount of bitterpit on Honeycrisp fruit in relation to the various rootstocks being tested. No specific protocols were developed by participants, in part because some orchards are treated with prophylactic calcium sprays while others are not.

For those interested in studying fruit calcium levels and/or bitter pit incidence, please send an email to the study participants to organize a separate complimentary experiment.

To avoid problems during compiling data, please pay particular attention to:

1. Submit only the data requested (in the Excel spreadsheet)
2. Use the correct units
3. Proof the data and make sure it make sense
4. Use only the rootstock designations provided in the Excel template drop down list.

Send Excel data worksheet using the **Excel file provided**. Please submit by **January 15, 2017** to John Cline (jcline@uoguelph.ca) who will be coordinating the data from this trial.

Simplified pruning and training plan for the Tall Spindle system
(provided by T. Robinson)

First Leaf (2014)

At Planting	Adjust graft union to 5-6” (12-15 cm) above soil level. Remove all feathers below 24” (60 cm) using a flush cut. Do not head leader or feathers. Remove any feathers that are larger than 2/3 the diameter of the leader leaving a stub.
3-4” Growth	Rub off 2nd and 3rd buds below the new leader bud to eliminate competitors to the leader shoot.
May	Install a 3-4 wire tree support system that will allow tree to be supported to 3m. Attach trees to support system with a permanent tree tie above 1st tier of scaffolds leaving a 2 inch diameter loop to allow for trunk grow.
Early June	Tie down each feather that is longer than 10” (25 cm) to a pendant position below horizontal.

Second Leaf (2015)

Dormant	Do not head leader or prune trees.
3-4” Growth	Rub off 2nd and 3rd buds below the new leader bud to eliminate competitors to the leader shoot.
Early June	Hand thin crop to single fruit four inches apart. (Target 15-20 fruits/tree)
Mid June	Tie developing leader to support system with permanent tie.

Third Leaf (2016)

Dormant	Do not head leader. Remove any overly vigorous limb that is more than 2/3 the diameter of the leader using a bevel cut.
Late May	Chemically thin according to crop load, tree strength, and weather conditions, then follow up with hand thinning to appropriate levels to ensure regular annual cropping and adequate fruit size. (Target 50-60 fruits/tree)
June	Tie developing leader to support system with a permanent tie.

Fourth Leaf (2017)

Dormant	Do not head leader. Remove overly vigorous limbs that are more than 2/3 the diameter of the leader using a bevel cut.
Late May	Chemically thin then follow up with hand thinning to appropriate levels to ensure regular annual cropping and adequate fruit size. (Target 100 fruits/tree, but based on trunk cross-sectional area)
June	Tie developing leader to support system with a permanent tie at the top of the support post.

Mature Tree Pruning (2018-)

Dormant	1. Limit tree height to 11.5’ (3.6m) by annually cutting leader back to a weak fruitful side branch. 2. Annually, remove at least 2 limbs including lower tier scaffolds that are more than ¾” in diameter using a bevel cut. 3. Simplify each remaining branch on the tree so that it is columnar with no major side branches. 4. Shorten branches that extend into the row to facilitate movement of equipment and preserve fruit quality on lower limbs.
Late May	Chemically thin then follow up with hand thinning to appropriate levels to ensure regular annual cropping and adequate fruit size. (Target 120-150 fruits/tree)
August	Lightly summer prune to encourage light penetration and maintain pyramidal tree shape.