ANNUAL REPORT TO NC-140

2014 Apple Rootstock Trials

November, 2015 -- Davis, CA

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2015 was the second year of the 2014 NC-140 Apple Rootstock Trials. Rootstocks included in this experiment are indicated below. All data presented in this report were collected in 2014 and analyzed by the data coordinator. All cooperators submitted data except three sites (NY, ON-Ridgetown, Indiana).

An Excel data template worksheet was provided to all cooperators to submit data. This generally worked well, however there were some data issues at some sites. Please use the Excel data template when submitting data -- a new worksheet template will be provided each year. Everyone is encouraged to review their data and make sure that all measurements are in the units requested. Only, include only those data requested in the protocol (provided in a separate file).

Rootstocks, cultivars and locations involved in the 2014 NC-140 Apple Rootstock Trial. Honeycrisp plantings are spaced 4'×12' (1.22m×3.66m) and Aztec Fuji plantings are spaced 5'×13' (1.52m×3.96m). All trees are trained to the tall spindle orchard system.

Rootstocks	Honeycrisp sites	Aztec Fuji sites
B.10	ID	AL
G.11	**IN***	ID
G.202	MA	GA
G.214	ME	NJ
G.30	MEX	ON (Simcoe)
G.41	**MI***	PA
G.5890	MN	SC
G.935	NJ	UT
G.969	**NY***	
M.26 EMLA	ON (Simcoe)	
M.7	**ON (Ridgetown)***	
M.9 T337	PA	
MM.106	VA	
V.1	WA	
V.5	WI	
V.6		
V.7		

* No data were submitted for 2014.

Summary of Data Submission

1. Review the data protocol located on the nc14o website (link)
2. Be sure to correct any errors in the data structure (treatments, reps) communicated by the data coordinator to you in 2014.
3. Submit only the data requested using the Excel data template worksheet, which can be found on the nc-140 website (link)
4. Submit only data collected in 2016 (not prior years) and use the correct units.

NC 140 Accomplishments Report Statement

2014 NC-140 Apple Rootstock Planting

The 2014 Apple rootstock planting was established in 15 locations in the United States (AL, ID, IN, MA, ME, MI, MN, GA, NJ, NY, PA, SC, UT, VA, WA, WI), two in Canada, and one in Mexico (http://bit.ly/1zv3wCc). The trial consists of the following rootstocks: 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, V.5, V.6, V.7. The trial is being coordinated by John Cline who has also responsible for data analyses. This trial has two cultivars: Aztec Fuji (AL, ID, GA, NJ, ON, PA, SC, UT) and Honeycrisp (ID, IN, MA, ME, Mexico, MI, MN, NJ, NY, Ontario, PA, VA, WA, WI), planted to a 'tall spindle' systems at a 5 x 12 ft, and 4 x12 ft spacing, respectively. Trees are planted using a randomized block design with single trees serving as experimental units. Each site selected a pollinizer variety since some sites are very limited in adapted varieties. Trees were established in the spring of 2014. The trees were propagated by Willow Drive Nursery, WA. Data protocols have been established for 2014, 2015 and 2016. In 2014, the following data were recorded: 1) initial trunk diameter measured at planting 30cm above graft union; 2) number of side branches >10 cm at planting; 3) trunk circumference in the fall of 2014; 4) height of the graft union above soil; 5) tree status at the end of the 2014 growing season. In 2016, trees were fruiting and similar data as 2014 were recorded in addition to yield data.

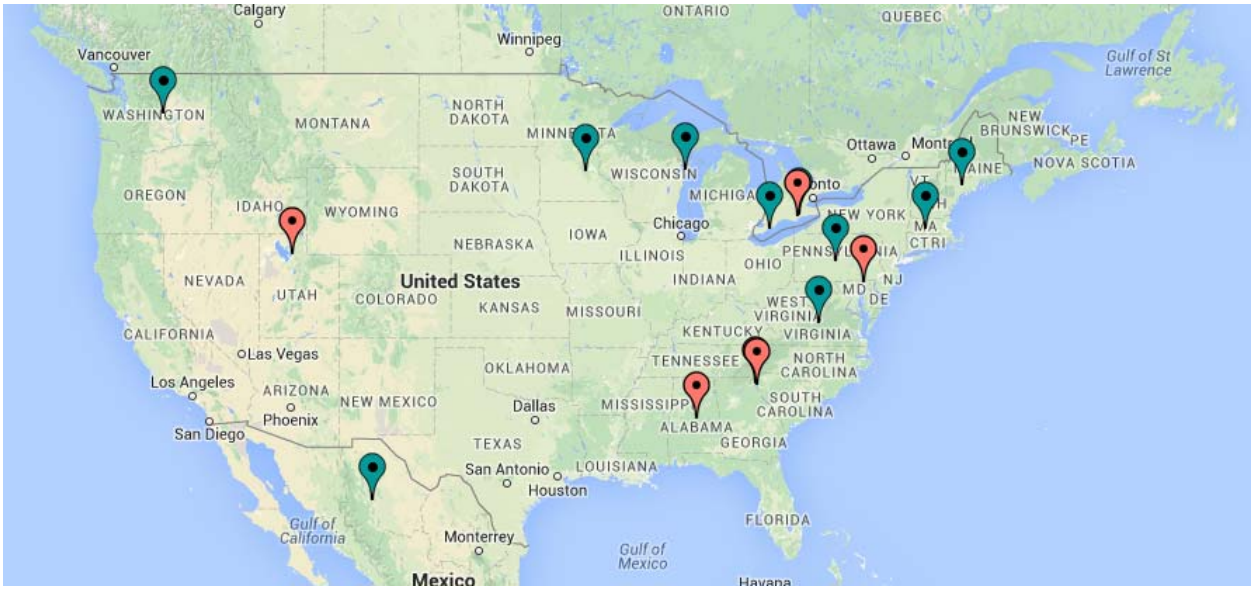

Figure 1. Location of participants of the 2014 NC-140 Apple rootstock planting evaluation of 'Aztec Fuji' (red) and 'Honeycrisp' (teal) in Canada, the United States, and Mexico. Map updated as of Nov 10, 2014 (not all participants provided gps coordinates). For an updated interactive map visit http://bit.ly/1zv3wCc

HONEYCRISP DATA

Table 1. Number of side branches >10 cm at planting, union height at planting, spring trunk cross-sectional area, fall trunk cross-sectional area, union breakage, and survival of Honeycrisp apple trees in the 2014 NC-140 Apple Rootstock Trial. Includes 2014 data from ID, MA, ME, MEX, MN, NJ, ON (Simc), PA, VA, WA, and WI.

Rootstock	Number of side branches (no.)	Union height (cm)	Spring trunk cross-sectional area (cm^2)	Fall trunk cross-sectional area (cm^2)	Union breakage (%)	Survival (%)
B.10	7.4	10.4	1.6	2.4	0	100
G.11	3.7	13.5	1.0	1.6	0	97
G.202	4.3	12.5	1.0	1.6	2	98
G.214	12.8	13.4	1.6	2.2	0	100
G.30	16.6	13.1	2.1	3.4	0	96
G.41	4.0	13.0	1.0	1.6	0	95
G.5890	14.7	12.8	2.3	3.3	0	98
G.935	5.4	13.9	1.1	1.9	0	99
G.969	8.1	12.9	1.4	2.2	2	98
M.26 EMLA	6.0	13.7	1.3	2.1	0	98
M.7	6.0	8.1	1.5	1.8	0	100
M.9 T337	4.9	14.2	1.3	2.0	0	98
MM.106	7.3	7.9	1.4	2.0	0	100
V.1	9.5	13.4	2.1	3.2	0	100
V.5	11.1	11.5	2.1	3.0	0	100
V.6	11.8	11.5	2.0	3.1	6	92
V.7	11.1	11.6	1.9	2.8	3	95
Means	8.5	12.8	1.5	2.4	1	97
LSD (P=0.05)						
HSD (P=0.05)						

Table 2. Number of side branches >10 cm at planting (2014, no.) of Honeycrisp apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	ID	IN	MA	ME	MI	MN	MEX	NJ	NY	ON (Simc)	ON (Ridg)	PA	VA	WA	WI	Means
B.10	---[y]	nd[z]	---	5.8	nd	---	---	11.0	nd	7.7	nd	---	4.0	---	8.9	7.4
G.11	---	nd	2.1	4.7	nd	1.9	3.6	5.6	nd	3.0	nd	---	1.5	7.8	3.7	3.7
G.202	7.7	nd	0.7	3.6	nd	4.0	1.5	5.0	nd	1.6	nd	---	4.7	10.8	4.5	4.3
G.214	---	nd	10.3	13.6	nd	7.6	---	18.9	nd	11.5	nd	---	6.9	15.0	18.7	12.8
G.30	22.9	nd	12.3	20.0	nd	10.6	14.2	21.1	nd	8.4	nd	---	14.2	20.0	22.8	16.6
G.41	---	nd	3.8	0.4	nd	2.9	4.0	5.3	nd	5.2	nd	---	2.1	6.3	6.5	4.0
G.5890	---	nd	13.8	---	nd	6.3	---	---	nd	---	nd	13.8	---	17.8	21.3	14.7
G.935	---	nd	3.5	4.2	nd	1.4	---	5.5	nd	7.7	nd	---	3.3	11.9	6.7	5.4
G.969	11.9	nd	6.4	7.9	nd	3.3	6.0	12.2	nd	8.2	nd	4.3	5.1	11.8	14.2	8.1
M.26 EMLA	9.9	nd	4.6	5.6	nd	2.2	7.3	7.6	nd	7.0	nd	2.9	2.1	8.4	8.0	6.0
M.7	---	nd	---	---	nd	---	---	---	nd	6.0	nd	---	---	---	---	6.0
M.9 T337	---	nd	3.8	---	nd	1.7	4.8	7.9	nd	5.7	nd	2.1	2.3	9.6	6.4	4.9
MM.106	---	nd	---	---	nd	---	---	---	nd	7.3	nd	---	---	---	---	7.3
V.1	11.3	nd	5.8	13.8	nd	3.7	---	10.6	nd	---	nd	6.8	8.6	11.4	13.9	9.5
V.5	---	nd	6.3	16.4	nd	8.9	---	10.3	nd	11.3	nd	5.1	9.5	16.7	17.7	11.1
V.6	---	nd	10.9	---	nd	4.8	6.0	17.4	nd	12.2	nd	10.1	7.2	18.3	18.0	11.8
V.7	---	nd	8.3	13.0	nd	3.1	---	13.5	nd	11.0	nd	6.8	8.8	17.3	19.6	11.1
Means	12.7	nd	6.5	8.7	nd	4.4	6.0	10.8	nd	7.5	nd	6.3	5.7	13.3	12.5	
LSD (P=0.05)																
HSD (P=0.05)																

[y] Rootstock was not included at planting location.

[z] No data were submitted.

Table 3. Union height at planting (2014, cm) of Honeycrisp apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	ID	IN	MA	ME	MI	MN	MEX	NJ	NY	ON (Simc)	ON (Ridg)	PA	VA	WA	WI	Means
B.10	---[y]	nd[z]	---	11.3	nd	---	---	9.6	nd	6.4	nd	---	14.0	---	10.7	10.4
G.11	---	nd	19.1	12.7	nd	11.6	11.3	14.2	nd	7.7	nd	---	16.9	14.8	12.9	13.5
G.202	12.7	nd	16.8	10.7	nd	12.6	10.1	12.1	nd	7.6	nd	---	16.1	13.7	12.3	12.5
G.214	---	nd	18.2	12.5	nd	13.3	---	12.3	nd	7.1	nd	---	16.6	15.2	12.3	13.4
G.30	12.2	nd	20.7	12.8	nd	12.5	11.2	12.5	nd	6.7	nd	---	16.5	12.9	12.7	13.1
G.41	---	nd	16.6	11.3	nd	11.4	10.5	12.6	nd	7.8	nd	---	18.1	15.4	13.4	13.0
G.5890	---	nd	16.7	---	nd	10.8	---	---	nd	---	nd	11.8	---	12.9	11.8	12.8
G.935	---	nd	18.7	12.9	nd	13.6	---	15.1	nd	7.8	nd	---	15.2	15.2	12.7	13.9
G.969	10.9	nd	17.4	12.8	nd	13.6	10.9	13.3	nd	7.6	nd	11.8	17.5	14.3	12.7	12.9
M.26 EMLA	10.7	nd	19.1	14.3	nd	14.4	11.6	13.5	nd	6.6	nd	14.0	17.6	14.0	14.8	13.7
M.7	---	nd	---	---	nd	---	---	---	nd	8.1	nd	---	---	---	---	8.1
M.9 T337	---	nd	20.1	---	nd	14.2	10.5	13.3	nd	6.8	nd	14.1	17.9	16.8	13.3	14.2
MM.106	---	nd	---	---	nd	---	---	---	nd	7.9	nd	---	---	---	---	7.9
V.1	12.2	nd	17.9	11.3	nd	12.9	---	11.4	nd	---	nd	11.7	17.7	12.5	13.0	13.4
V.5	---	nd	13.0	9.0	nd	12.8	---	11.6	nd	7.9	nd	10.5	14.3	12.6	10.7	11.5
V.6	---	nd	15.0	---	nd	10.2	8.7	12.1	nd	6.0	nd	11.3	14.8	13.2	11.2	11.5
V.7	---	nd	14.6	11.9	nd	11.9	---	11.4	nd	6.1	nd	11.7	14.3	11.6	10.9	11.6
Means	11.8	nd	17.5	12.1	nd	12.7	10.6	12.6	nd	7.2	nd	12.1	16.3	13.9	12.4	
LSD (P=0.05)																
HSD (P=0.05)																

[y] Rootstock was not included at planting location.

[z] No data were submitted.

Table 4. Spring trunk cross-sectional area (2014, cm^2) of Honeycrisp apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	ID	IN	MA	ME	MI	MN	MEX	NJ	NY	ON (Simc)	ON (Ridg)	PA	VA	WA	WI	Means
B.10	---[y]	nd[z]	---	1.4	nd	---	---	1.7	nd	2.1	nd	---	1.7	---	1.4	1.6
G.11	---	nd	0.9	0.9	nd	1.1	0.8	1.1	nd	1.0	nd	---	0.8	1.2	0.9	1.0
G.202	1.2	nd	0.7	0.8	nd	1.3	0.6	1.0	nd	0.8	nd	---	1.1	1.6	0.9	1.0
G.214	---	nd	1.6	1.4	nd	1.6	---	1.5	nd	1.6	nd	---	1.5	1.9	1.6	1.6
G.30	2.4	nd	2.4	2.0	nd	2.1	1.5	2.2	nd	1.5	nd	---	1.9	2.7	2.4	2.1
G.41	---	nd	0.9	0.6	nd	1.1	0.9	0.9	nd	1.1	nd	---	0.9	1.2	0.9	1.0
G.5890	---	nd	2.3	---	nd	1.7	---	---	nd	---	nd	2.5	---	2.4	2.6	2.3
G.935	---	nd	1.0	0.9	nd	0.8	---	1.0	nd	1.4	nd	---	1.0	1.9	1.0	1.1
G.969	1.3	nd	1.3	1.2	nd	1.4	1.0	1.4	nd	1.4	nd	1.7	1.3	1.5	1.5	1.4
M.26 EMLA	1.2	nd	1.2	1.1	nd	1.3	1.1	1.4	nd	1.4	nd	1.4	1.1	1.7	1.0	1.3
M.7	---	nd	---	---	nd	---	---	---	nd	1.5	nd	---	---	---	---	1.5
M.9 T337	---	nd	1.2	---	nd	1.3	1.0	1.2	nd	1.4	nd	1.7	1.1	1.5	1.1	1.3
MM.106	---	nd	---	---	nd	---	---	---	nd	1.4	nd	---	---	---	---	1.4
V.1	1.8	nd	2.0	1.8	nd	1.9	---	2.3	nd	---	nd	2.4	2.0	2.5	2.0	2.1
V.5	---	nd	1.6	1.7	nd	2.6	---	1.4	nd	2.2	nd	1.9	2.0	3.3	2.1	2.1
V.6	---	nd	2.0	---	nd	1.6	1.1	2.0	nd	2.1	nd	2.5	1.8	2.9	2.0	2.0
V.7	---	nd	1.5	1.5	nd	1.1	---	1.6	nd	2.1	nd	2.0	1.9	2.7	2.2	1.9
Means	1.6	nd	1.5	1.3	nd	1.5	1.0	1.5	nd	1.5	nd	2.0	1.4	2.1	1.6	
LSD (P=0.05)																
HSD (P=0.05)																

[y] Rootstock was not included at planting location.

[z] No data were submitted.

Table 5. Fall trunk cross-sectional area (2014, cm^2) of Honeycrisp apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	ID	IN	MA	ME	MI	MN	MEX	NJ	NY	ON (Simc)	ON (Ridg)	PA	VA	WA	WI	Means
B.10	---[y]	nd[z]	---	2.4	nd	---	---	3.3	nd	2.2	nd	---	2.1	---	2.0	2.4
G.11	---	nd	1.6	1.6	nd	1.2	1.4	2.9	nd	1.2	nd	---	1.5	1.4	1.6	1.6
G.202	2.4	nd	1.1	1.5	nd	1.3	1.1	2.7	nd	1.2	nd	---	1.6	1.9	1.5	1.6
G.214	---	nd	2.3	2.1	nd	1.7	---	3.1	nd	2.1	nd	---	2.1	2.1	2.4	2.2
G.30	4.9	nd	3.8	3.2	nd	2.2	3.1	4.8	nd	2.2	nd	---	2.7	3.1	3.9	3.4
G.41	---	nd	1.8	1.3	nd	1.2	1.5	2.5	nd	1.2	nd	---	1.5	1.4	2.0	1.6
G.5890	---	nd	3.8	---	nd	1.8	---	---	nd	---	nd	3.8	---	2.8	4.0	3.3
G.935	---	nd	2.0	1.6	nd	0.9	---	2.6	nd	1.7	nd	---	1.7	2.2	2.1	1.9
G.969	2.9	nd	2.2	2.2	nd	1.4	1.8	3.7	nd	1.6	nd	2.6	1.7	1.7	2.5	2.2
M.26 EMLA	2.9	nd	2.0	1.9	nd	1.3	1.8	3.3	nd	1.8	nd	2.4	1.6	1.9	1.9	2.1
M.7	---	nd	---	---	nd	---	---	---	nd	1.8	nd	---	---	---	---	1.8
M.9 T337	---	nd	1.9	---	nd	1.2	1.8	3.2	nd	1.6	nd	2.5	1.7	1.8	1.8	2.0
MM.106	---	nd	---	---	nd	---	---	---	nd	2.0	nd	---	---	---	---	2.0
V.1	3.5	nd	3.2	3.0	nd	2.1	---	4.3	nd	---	nd	3.7	2.9	2.9	3.1	3.2
V.5	---	nd	3.0	2.8	nd	2.9	---	3.5	nd	2.7	nd	2.7	2.6	3.5	3.0	3.0
V.6	---	nd	3.8	---	nd	1.8	2.0	4.2	nd	2.6	nd	3.8	2.6	3.1	3.3	3.1
V.7	---	nd	2.8	2.4	nd	1.3	---	4.3	nd	2.6	nd	2.9	2.5	3.2	3.1	2.8
Means	3.3	nd	2.5	2.1	nd	1.6	1.8	3.4	nd	1.9	nd	3.0	2.1	2.4	2.5	
LSD (P=0.05)																
HSD (P=0.05)																

[y] Rootstock was not included at planting location.

[z] No data were submitted.

Table 6. Union breakage (2014, %) of Honeycrisp apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	ID	IN	MA	ME	MI	MN	MEX	NJ	NY	ON (Simc)	ON (Ridg)	PA	VA	WA	WI	Means
B.10	---[y]	nd[z]	---	0	nd	---	---	0	nd	0	nd	---	0	---	0	0
G.11	---	nd	0	0	nd	0	0	0	nd	0	nd	---	0	0	0	0
G.202	0	nd	0	0	nd	0	0	0	nd	0	nd	---	10	0	0	2
G.214	---	nd	0	0	nd	0	---	0	nd	0	nd	---	0	0	0	0
G.30	0	nd	0	0	nd	0	0	0	nd	0	nd	---	0	0	0	0
G.41	---	nd	0	0	nd	0	0	0	nd	0	nd	---	0	0	0	0
G.5890	---	nd	0	---	nd	0	---	---	nd	---	nd	0	---	0	0	0
G.935	---	nd	0	0	nd	0	---	0	nd	0	nd	---	0	0	0	0
G.969	0	nd	0	20	nd	0	0	0	nd	0	nd	0	0	0	0	2
M.26 EMLA	0	nd	0	0	nd	0	0	0	nd	0	nd	0	0	0	0	0
M.7	---	nd	---	---	nd	---	---	---	nd	0	nd	---	---	---	---	0
M.9 T337	---	nd	0	---	nd	0	0	0	nd	0	nd	0	0	0	0	0
MM.106	---	nd	---	---	nd	---	---	---	nd	0	nd	---	---	---	---	0
V.1	0	nd	0	0	nd	0	---	0	nd	---	nd	0	0	0	0	0
V.5	---	nd	0	0	nd	0	---	0	nd	0	nd	0	0	0	0	0
V.6	---	nd	0	---	nd	33	13	11	nd	0	nd	0	0	0	0	6
V.7	---	nd	0	0	nd	11	---	0	nd	0	nd	0	0	0	13	3
Means	0	nd	0	2	nd	4	1	1	nd	0	nd	0	1	0	1	
LSD (P=0.05)																
HSD (P=0.05)																

[y] Rootstock was not included at planting location.

[z] No data were submitted.

Table 7. Survival (2014, %) of Honeycrisp apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	ID	IN	MA	ME	MI	MN	MEX	NJ	NY	ON (Simc)	ON (Ridg)	PA	VA	WA	WI	Means
B.10	---[y]	nd[z]	---	100	nd	---	---	100	nd	100	nd	---	100	---	100	100
G.11	---	nd	100	100	nd	100	70	100	nd	100	nd	---	100	100	100	97
G.202	100	nd	100	100	nd	90	100	100	nd	100	nd	---	90	100	100	98
G.214	---	nd	100	100	nd	100	---	100	nd	100	nd	---	100	100	100	100
G.30	100	nd	100	100	nd	100	60	100	nd	100	nd	---	100	100	100	96
G.41	---	nd	100	100	nd	100	80	100	nd	80	nd	---	100	100	100	95
G.5890	---	nd	100	---	nd	89	---	---	nd	---	nd	100	---	100	100	98
G.935	---	nd	100	100	nd	100	---	100	nd	90	nd	---	100	100	100	99
G.969	100	nd	100	80	nd	100	100	100	nd	100	nd	100	100	100	100	98
M.26 EMLA	100	nd	100	100	nd	100	80	100	nd	100	nd	100	100	100	100	98
M.7	---	nd	---	---	nd	---	---	---	nd	100	nd	---	---	---	---	100
M.9 T337	---	nd	100	---	nd	100	80	100	nd	100	nd	100	100	100	100	98
MM.106	---	nd	---	---	nd	---	---	---	nd	100	nd	---	---	---	---	100
V.1	100	nd	100	100	nd	100	---	100	nd	---	nd	100	100	100	100	100
V.5	---	nd	100	100	nd	100	---	100	nd	100	nd	100	100	100	100	100
V.6	---	nd	100	---	nd	67	75	78	nd	100	nd	100	100	100	100	92
V.7	---	nd	100	100	nd	89	---	88	nd	88	nd	100	100	100	88	95
Means	100	nd	100	98	nd	96	80	98	nd	97	nd	100	99	100	99	
LSD (P=0.05)																
HSD (P=0.05)																

[y] Rootstock was not included at planting location.

[z] No data were submitted.

FUJI DATA

Table 1. Number of side branches >10 cm at planting, union height at planting, spring trunk cross-sectional area, fall trunk cross-sectional area, union breakage, and survival of Aztec Fuji apple trees in the 2014 NC-140 Apple Rootstock Trial. Includes 2014 data from AL, ID, GA, NJ, ON (Simcoe), PA, SC, and UT.

Rootstock	Number of side branches (no.)	Union height (cm)	Spring trunk cross-sectional area (cm^2)	Fall trunk cross-sectional area (cm^2)	Union breakage (%)	Survival (%)
B.10	5.2	10.4	1.5	3.2	0	100
G.11	8.1	13.0	1.2	3.1	0	99
G.202	5.0	11.4	1.1	3.2	0	93
G.214	8.1	11.3	1.7	3.4	1	97
G.30	9.8	12.4	1.9	5.0	0	100
G.41	4.8	10.8	1.5	3.9	0	100
G.935	9.2	12.4	1.7	4.1	0	100
G.969	7.8	13.8	1.5	4.6	0	98
M.26 EMLA	2.7	13.0	1.1	3.1	0	100
M.9 T337	7.9	12.0	1.3	3.4	0	97
V.1	9.1	12.3	1.8	4.6	0	100
V.5	13.1	10.0	2.4	5.8	0	99
V.6	13.9	9.8	2.5	6.1	0	100
V.7	11.3	10.2	2.2	5.1	0	100
Means	8.4	11.6	1.7	4.2	0	99
LSD (P=0.05)						
HSD (P=0.05)						

Table 2. Number of side branches >10 cm at planting (2014, no.) of Aztec Fuji apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	AL	GA	ID	NJ	ON (Simc)	PA	SC	UT	Means
B.10	6.3	2.6	7.3	---[y]	5.3	---	5.1	4.7	5.2
G.11	9.4	4.3	9.3	12.3	5.5	---	5.1	10.7	8.1
G.202	5.8	5.5	5.0	2.7	2.0	---	5.5	8.8	5.0
G.214	6.1	5.5	14.5	4.6	7.3	8.5	9.4	8.8	8.1
G.30	9.3	8.4	11.7	11.3	7.6	---	10.6	9.9	9.8
G.41	5.3	3.5	5.1	---	5.0	---	5.1	5.0	4.8
G.935	10.7	9.8	10.4	8.1	6.9	---	9.6	8.8	9.2
G.969	8.4	5.2	10.5	---	---	---	8.2	6.8	7.8
M.26 EMLA	6.1	1.8	2.7	2.5	1.4	2.1	1.6	3.7	2.7
M.9 T337	11.4	5.7	8.4	11.5	6.5	3.8	7.5	8.0	7.9
V.1	8.7	7.1	10.8	8.6	---	8.7	9.5	10.5	9.1
V.5	11.4	10.4	16.9	12.8	9.9	12.5	16.1	14.4	13.1
V.6	25.2	10.9	15.7	11.9	8.4	13.5	12.8	12.6	13.9
V.7	11.9	10.0	12.3	9.9	10.9	12.3	11.6	11.8	11.3
Means	9.8	6.5	10.0	8.7	6.4	8.8	8.4	8.9	
LSD (P=0.05)									
HSD (P=0.05)									

[y] Rootstock was not included at planting location.

Table 3. Union height at planting (2014, cm) of Aztec Fuji apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	AL	GA	ID	NJ	ON (Simc)	PA	SC	UT	Means
B.10	14.1	10.7	7.5	---[y]	7.7	---	13.1	9.2	10.4
G.11	17.9	14.9	9.8	11.9	9.1	---	16.1	11.0	13.0
G.202	16.6	13.2	8.8	8.1	9.1	---	14.9	8.7	11.4
G.214	17.1	12.2	9.8	10.5	8.1	9.8	15.1	8.6	11.3
G.30	19.2	13.2	10.4	11.4	7.8	---	15.7	9.4	12.4
G.41	16.5	10.3	8.2	---	7.7	---	13.8	8.5	10.8
G.935	19.3	14.7	9.2	10.3	8.9	---	15.1	9.2	12.4
G.969	20.3	14.5	9.2	---	---	---	15.8	9.0	13.8
M.26 EMLA	20.9	14.4	9.8	11.6	7.4	12.7	16.4	11.0	13.0
M.9 T337	17.1	14.3	11.5	8.5	8.5	11.3	15.8	9.4	12.0
V.1	17.0	11.9	11.0	10.3	---	10.8	15.8	9.0	12.3
V.5	17.7	11.2	8.2	6.8	7.5	9.4	12.9	6.5	10.0
V.6	15.7	10.2	8.2	8.9	8.9	9.1	10.8	6.2	9.8
V.7	17.1	12.7	8.8	7.5	7.9	8.0	12.2	7.7	10.2
Means	17.6	12.7	9.3	9.6	8.2	10.1	14.5	8.8	
LSD (P=0.05)									
HSD (P=0.05)									

[y] Rootstock was not included at planting location.

Table 4. Spring trunk cross-sectional area (2014, cm^2) of Aztec Fuji apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	AL	GA	ID	NJ	ON (Simc)	PA	SC	UT	Means
B.10	1.8	1.2	1.9	---[y]	2.3	---	1.8	1.8	1.5
G.11	1.4	1.3	1.2	1.4	1.4	---	1.5	1.4	1.2
G.202	1.7	1.4	1.3	0.8	1.0	---	1.4	2.3	1.1
G.214	1.5	1.4	2.6	1.4	2.1	2.2	2.1	2.2	1.7
G.30	2.8	1.9	2.2	2.5	2.3	---	2.0	2.1	1.9
G.41	2.0	1.4	1.7	---	2.2	---	1.8	2.2	1.5
G.935	2.3	2.0	2.0	1.9	2.1	---	1.9	1.9	1.7
G.969	2.0	1.3	2.1	---	---	---	1.6	1.7	1.5
M.26 EMLA	1.4	1.3	1.1	1.4	1.3	1.5	1.1	1.4	1.1
M.9 T337	1.9	1.4	1.1	1.3	1.6	1.6	1.3	1.3	1.3
V.1	2.5	2.0	1.8	2.1	---	2.4	1.8	2.2	1.8
V.5	2.7	2.2	3.2	2.2	3.1	3.1	2.8	3.6	2.4
V.6	4.0	2.2	3.2	2.4	2.4	3.2	2.9	2.7	2.5
V.7	2.8	2.3	2.4	1.8	2.9	3.0	2.1	2.5	2.2
Means	2.2	1.7	2.0	1.7	2.1	2.4	1.9	2.1	
LSD (P=0.05)									
HSD (P=0.05)									

[y] Rootstock was not included at planting location.

Table 5. Fall trunk cross-sectional area (2014, cm^2) of Aztec Fuji apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	AL	GA	ID	NJ	ON (Simc)	PA	SC	UT	Means
B.10	2.7	1.8	5.2	---[y]	2.4	---	3.6	3.7	3.2
G.11	2.5	2.4	5.3	2.6	1.7	---	3.2	4.4	3.1
G.202	3.0	2.7	5.0	1.7	1.2	---	3.3	5.3	3.2
G.214	2.3	2.3	5.7	2.4	2.2	2.8	4.5	4.6	3.4
G.30	4.5	4.6	7.9	3.8	2.7	---	5.6	6.1	5.0
G.41	2.6	3.0	5.7	---	2.4	---	3.9	5.7	3.9
G.935	3.9	4.2	5.6	3.3	2.2	---	4.7	4.7	4.1
G.969	4.5	2.5	6.0	---	---	---	4.7	5.2	4.6
M.26 EMLA	3.0	3.2	4.7	2.5	1.6	2.0	3.7	4.2	3.1
M.9 T337	3.7	3.1	5.5	2.6	1.8	2.1	3.5	4.5	3.4
V.1	3.9	4.6	6.4	3.8	---	3.3	5.1	5.3	4.6
V.5	4.6	4.9	10.1	3.7	3.3	4.0	7.6	8.0	5.8
V.6	6.4	6.2	10.1	3.8	2.9	4.1	7.4	7.4	6.1
V.7	4.9	5.6	7.4	3.5	3.2	3.7	5.8	6.8	5.1
Means	3.8	3.7	6.5	3.1	2.3	3.1	4.7	5.4	
LSD (P=0.05)									
HSD (P=0.05)									

[y] Rootstock was not included at planting location.

Table 6. Union breakage (2014, %) of Aztec Fuji apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	AL	GA	ID	NJ	ON (Simc)	PA	SC	UT	Means
B.10	0	0	0	---[y]	0	---	0	0	0
G.11	0	0	0	0	0	---	0	0	0
G.202	0	0	0	0	0	---	0	0	0
G.214	11	0	0	0	0	0	0	0	1
G.30	0	0	0	0	0	---	0	0	0
G.41	0	0	0	---	0	---	0	0	0
G.935	0	0	0	0	0	---	0	0	0
G.969	0	0	0	---	---	---	0	0	0
M.26 EMLA	0	0	0	0	0	0	0	0	0
M.9 T337	0	0	0	0	0	0	0	0	0
V.1	0	0	0	0	---	0	0	0	0
V.5	0	0	0	0	0	0	0	0	0
V.6	0	0	0	0	0	0	0	0	0
V.7	0	0	0	0	0	0	0	0	0
Means	1	0	0	0	0	0	0	0	
LSD (P=0.05)									
HSD (P=0.05)									

[y] Rootstock was not included at planting location.

Table 7. Survival (2014, %) of Aztec Fuji apple trees at individual planting locations in the 2014 NC-140 Apple Rootstock Trial.

Rootstock	AL	GA	ID	NJ	ON (Simc)	PA	SC	UT	Means
B.10	100	100	100	---[y]	100	---	100	100	100
G.11	100	100	100	100	100	---	100	90	99
G.202	100	80	100	100	70	---	100	100	93
G.214	89	100	100	100	90	100	100	100	97
G.30	100	100	100	100	100	---	100	100	100
G.41	100	100	100	---	100	---	100	100	100
G.935	100	100	100	100	100	---	100	100	100
G.969	100	100	100	---	---	---	90	100	98
M.26 EMLA	100	100	100	100	100	100	100	100	100
M.9 T337	90	100	100	89	100	100	100	100	97
V.1	100	100	100	100	---	100	100	100	100
V.5	100	100	100	100	100	100	90	100	99
V.6	100	100	100	100	100	100	100	100	100
V.7	100	100	100	100	100	100	100	100	100
Means	99	99	100	99	97	100	99	99	
LSD (P=0.05)									
HSD (P=0.05)									

[y] Rootstock was not included at planting location.