ANNUAL REPORT TO NC-140

2010 Apple Rootstock Trials

November, 2012 -- Portland, ME

Wesley R. Autio

This year was the third season of the 2010 NC-140 Apple Rootstock Trials. Data submitted in 2011-12, however, were for the second growing season (2011). All submitted data were received in an easily read format, but there were a few problems with units. **Everyone is encouraged to review their data and make sure that all measurements are the unit requested**. A problem with the 2011 (and 2010) data submission was the lack of submission by 3 cooperators -- this situation is completely unacceptable. All data should be submitted in the format and units requested and by the submission deadline (January 15).

It is important to note that there are multiple trees of the same rootstock within each replication. This situation has the potential to cause confusion, so a sub-replication number has been added to the data request. Also, each cooperator will be submitting all previous years' data with each submission for the rest of the trial.

The data to be submitted and the format of the data submission are presented in the Data Submission Protocol on Page 3. Submit these data in spreadsheet format (Excel preferred), using the rootstock codes described in the protocol, by **January 15, 2013**.

In 2013, follow the Pruning and Training Plan (Page 2) and the Trial Protocol for 2013 (Page 2).

To avoid problems during the compilation of the data, please pay paticular attention to the following points:

1. **Submit only the data requested.**
2. **Use the correct units.**
3. **Make sure that all data make sense -- proofread your data set.**
4. **For rootstock and replication designations, follow the protocol exactly -- rootstock names should appear as they are listed in the Data Submission Protocol (Page 3) -- please note that there are no spaces in any of these names.**

Rootstocks, cultivars, and locations involved in the 2010 NC-140 Apple Rootstock Trial. Honeycrisp plantings are spaced 4'x12', and Fuji plantings are spaced 6'x14'. All trees are trained to the Tall Spindle System.

Rootstocks	Honeycrisp sites	Aztec Fuji sites
B.9	BC	CH
B.10	CH	ID
B.7-3-150	CO*	KY
B.7-20-21	IL*	NC
B.64-194	IA	NY
B.67-5-32	MA	PA
B.70-6-8	MN	UT
B.70-20-20	MI	
B.71-7-22	NJ	
G.11	NS	
G.41 N	NY	
G.41 TC	OH*	
G.202 N	UT	
G.202 TC	WI	
G.935 N		
G.935 TC		
CG.2034		
CG.3001		
CG.4003		
CG.4004		
CG.4013		
CG.4214		
CG.4814		
CG.5087		
CG.5222		
PiAu 9-90		
PiAu 51-11		
Supp.3		
M.26 EMLA		
M.9 Pajam2		
M.9 NAKBT337		

*No data were submitted for 2010 or 2011.

Send 2010 data via email to Wes Autio (autio@umass.edu) by

January 15, 2013

Trial Protocol for 2013

Tree management.

A. Trees must be supported and trained as Tall Spindles (see Pruning & Training Plan, 4th Leaf).
B. Adjust crop load as described in the Pruning & Training Plan, 4th Leaf.
C. For Honeycrisp, apply naphthalene acetic acid (NAA) as described in the Pruning & Training Plan, 4th Leaf.
D. Manage pests, nutrients, and water per local recommendations. Pay attention to weed control in this trial.

Collect the follow data for each tree in 2013.

A. Root suckers: the number removed and counted, August.
B. Yield: count all fruit per tree and weigh (to the nearest 0.1 kg).
C. Zonal leaf chlorosis: after Honeycrisp harvest, visually estimate the portion (%) of the canopy exhibiting symptoms.
D. Trunk size: trunk circumference 30 cm above the graft union (mm), October.
E. Status: 0=dead, 1=alive, and 2=missing data, October.

Pruning and Training Plan for the Tall Spindle System

4th Leaf	Dormant	Do not head the leader. Using a bevel cut, remove any overly vigorous limbs that are more than ⅔ the diameter of the leader.
	Late May	Chemically thin, and then follow up with hand thinning to appropriate levels to ensure regular annual cropping and adequate fruit size. (Target about 100 fruits/tree, Honeycrisp – 4 fruit/cm^2, Fuji -- 5 fruit/cm^2)
	June	Tie the developing leader to the support system with a permanent tie.
	June-July	For Honeycrisp, apply four 5-ppm naphthalene acetic acid applications at 1-week to 10-day intervals beginning when fruit reach an average of 30 mm in diameter.
Mature Tree	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 the lower limbs.
	Late May	Chemically thin, and 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.

Data Submission Protocol

Submit data via email (autio@umass.edu) by **January 15, 2013**.

STATE 2010 Apple Rootstock Trial DATA FOR 2012

Cultivar	Rootstock	Rep	Sub-rep	2010 Status (see below)	Trunk circ. (spring, 2010, mm)	Side branches (spring, 2010, no.>10cm)	Height of the graft union (spring, 2010, mm)	Trunk circ. (fall, 2010, mm)	Comments regarding trees which died during 2010 (those with status = 0)	**2011 Status (0=dead, 1=alive, 2=missing data)**	**Flower clusters (no.)**	**Root sucker (Aug, 2011, no.)**	**Yield per tree (2011) (kg)**	**Trunk circ. (fall, 2011, mm)**	**Comments regarding trees which died during 2011 (those with status = 0)**	**2012 Status (0=dead, 1=alive, 2=missing data)**	**Root sucker (Aug, 2012, no.)**	**Yield per tree (2012, kg)**	**Yield per tree (2012, no.)**	**Zonal chlorosis (Honeycrisp, 2012, %)**	**Trunk circ. (fall, 2012, mm)**	**Comments regarding trees which died during 2012 (those with status = 0)**
Honeycrisp	B.9	1	1	1	X	X	X	X		**1**	**X**	**X**	**X**	**X**		**1**	**X**	**X**	**X**	**X**	**X**	
Honeycrisp	B.9	1	2	0	X	X	X	.	fireblight	**0**	**.**	**.**	**.**	**.**		**0**	**.**	**.**	**.**	**.**	**.**	
Honeycrisp	B.9	1	3	1	X	X	X	X		**1**	**X**	**X**	**X**	**X**		**1**	**X**	**X**	**X**	**X**	**X**	
.	.	.	.	.	.	.	.	.		**.**	**.**	**.**	**.**	**.**		**.**	**.**	**.**	**.**	**.**	**.**	
.	.	.	.	.	.	.	.	.		**.**	**.**	**.**	**.**	**.**		**.**	**.**	**.**	**.**	**.**	**.**	
.	.	.	.	.	.	.	.	.		**.**	**.**	**.**	**.**	**.**		**.**	**.**	**.**	**.**	**.**	**.**	
Honeycrisp	M.26EMLA	4	1	1	X	X	X	X		**0**	**X**	**X**	**X**	**X**	**Voles**	**0**	**X**	**X**	**X**	**X**	**X**	
Honeycrisp	M.26EMLA	4	2	3	.	.	.	.		**2**	**.**	**.**	**.**	**.**		**2**	**.**	**.**	**.**	**.**	**.**	
Honeycrisp	M.26EMLA	4	3	4	.	.	.	.		**2**	**.**	**.**	**.**	**.**		**2**	**.**	**.**	**.**	**.**	**.**	

Status 2010:

0 = died after it was clearly growing well
1 = alive
2 = considered to be a non-data tree because of human error (like tractor blight)
3 = planted but broke at the union before it was fully supported
4 = leafed out but quickly shut down
5 = never leafed out and began to grow

When a data point is missing, insert a period in that cell, but do not replace zeros with periods.

REQUIRED DATA FORMAT: Excel or Quatro Pro

Rootstock Codes: (do not include spaces in the rootstock name)

B.9	B.67-5-32	G.41N	G.935TC	CG.4013	PiAu9-90	M.26EMLA
B.10	B.70-6-8	G.41TC	CG.2034	CG.4214	PiAu51-11	M.9Pajam2
B.7-3-150	B.70-20-20	G.202N	CG.3001	CG.4814	Supp.3	M.9T337
B.7-20-21	B.71-7-22	G.202TC	CG.4003	CG.5087		
B.64-194	G.11	G.935N	CG.4004	CG.5222		

Table 1. Trunk cross-sectional area (October 2010 and 2011), number of branches at planting(>10cm), union height at planting, blossom density in 2011, and root suckers in 2011 of Honeycrisp apple trees in the 2010 NC-140 Honeycrisp Apple Rootstock Trial.[z]

Rootstock	Trunk cross sectional area at planting (cm^2)	Branches at planting (no. > 10cm)	Graft union height at planting (cm)	Trunk cross-sectional area (cm^2, 2010)	Blossom density (no. clusters/cm^2, 2011)	Root suckers (no., 2011)	Trunk cross-sectional area (cm^2, 2011)
B.9	1.3 ef	5.7 ij	11.5 efg	1.7 jk	12.5 a	0.3 cd	2.9 l
B.10	1.5 cd	5.8 ij	11.2 fgh	2.2 fgh	2.0 bcd	0.0 d	4.1 hijk
B.7-3-150	1.3 ef	3.5 k	12.6 abcde	2.0 ghi	7.4 abc	0.0 d	4.6 gh
B.7-20-21	1.9 b	8.6 gh	12.9 abcd	3.1 b	5.6 bcd	0.1 d	6.4 b
B.64-194	1.9 b	7.2 hi	13.3 abc	2.8 cd	3.2 bcd	0.1 d	6.1 bcd
B.67-5-32	1.6 c	5.5 ij	11.2 fgh	2.3 ef	5.5 bcd	0.1 d	5.0 fg
B.70-6-8	1.6 c	5.8 ij	11.4 efgh	2.4 e	7.2 abc	0.1 d	5.1 ef
B.70-20-20	2.3 a	11.2 fg	13.3 abc	3.8 a	0.3 d	0.2 cd	9.0 a
B.71-7-22	0.7 h	0.1 l	12.0 bcdefg	0.8 l	10.9 ab	0.3 bcd	1.3 m
G.11	1.4 de	10.6 fg	12.2 bcdefg	2.1 gh	6.1 bcd	0.2 cd	3.9 jkl
G.41N	1.3 ef	6.1 ij	11.5 efgh	1.9 hij	5.0 bcd	0.1 d	3.8 jkl
G.41TC	1.1 g	4.3 ijk	7.9 i	1.5 k	1.8 bcd	0.2 cd	3.2 l
G.202N	1.9 b	12.4 cde	10.8 fgh	2.9 bc	1.4 cd	0.7 bc	6.2 bc
G.202TC	1.5 cd	11.3 def	9.8 ghi	2.4 e	1.5 cd	0.9 ab	4.9 fgh
G.935N	1.7 c	11.8 de	11.5 efgh	2.4 e	1.4 cd	0.2 cd	5.0 fg
G.935TC	1.3 ef	7.7 hi	9.4 hi	1.9 hij	2.6 bcd	0.4 bcd	4.1 hijk
CG.2034	1.3 ef	7.2 hi	9.7 ghi	1.8 ijk	7.1 abcd	0.2 cd	3.5 kl
CG.3001	1.7 c	11.7 def	10.6 fgh	2.7 cde	1.9 bcd	0.0 d	5.6 cdef
CG.4003	1.2 fg	5.9 ij	12.2 bcdef	1.8 ijk	6.9 abcd	0.1 d	3.6 kl
CG.4004	1.6 c	15.4 ab	11.2 fgh	2.5 de	3.9 bcd	0.5 bcd	5.7 cde
CG.4013	1.4 de	9.8 fgh	9.8 ghi	1.9 hij	6.5 abcd	0.3 cd	3.8 jkl
CG.4214	1.4 de	13.3 bcd	11.6 defg	2.0 ghi	5.9 bcd	0.6 bc	4.0 ijk
CG.4814	1.7 c	13.5 bcd	11.5 efgh	2.5 de	2.6 bcd	0.7 bc	5.1 ef
CG.5087	1.7 c	14.7 abc	12.1 bcdefg	2.3 efg	0.7 cd	0.5 bcd	4.9 fgh
Supp.3	1.1 g	4.2 jk	11.3 efgh	1.6 jk	5.6 bcd	0.2 cd	3.6 kl
PiAu 9-90	2.4 a	17.4 a	14.3 a	3.6 a	0.3 d	0.1 d	6.6 b
PiAu 51-11	1.9 b	9.0 gh	13.3 abc	2.6 cde	2.6 bcd	0.1 d	5.2 def
M.9 NAKBT337	1.4 de	7.5 hi	12.4 abcdef	2.0 ghi	2.5 bcd	0.6 bc	3.9 jkl
M.9 Pajam 2	1.6 c	8.2 h	13.4 ab	2.3 efg	3.0 bcd	1.2 a	4.5 hi
M.26 EMLA	1.3 ef	4.8 ijk	11.9 cdefg	2.0 ghi	5.0 bcd	0.3 cd	4.3 hij

[z] Least-squares mean separation within column by Tukey's HSD (P = 0.05).

Table 2. Blossom density (no. clusters/ cm^2) in 2011 of Honeycrisp apple trees on various rootstocks in the 2010 NC-140 Honeycrisp Apple Rootstock Trial.

Rootstock	IA	NY
B.9	0.6	24.4
B.10	0.7	3.6
B.7-3-150	0.3	14.1
B.7-20-21	0.4	10.9
B.64-194	0.5	5.9
B.67-5-32	0.0	10.7
B.70-6-8	0.3	14.0
B.70-20-20	0.0	0.6
B.71-7-22	6.0	16.4
G.11	0.3	12.0
G.41N	0.0	10.0
G.41TC	0.0	2.0
G.202N	0.0	2.8
G.202TC	0.0	2.5
G.935N	0.0	9.1
G.935TC	0.0	5.3
CG.2034	0.0	14.2
CG.3001	0.0	3.8
CG.4003	0.0	13.4
CG.4004	1.2	6.6
CG.4013	0.0	13.0
CG.4214	0.2	11.7
CG.4814	0.0	5.3
CG.5087	0.0	1.4
CG.5222	---	2.1
Supp.3	0.3	10.3
PiAu 9-90	0.0	0.5
PiAu 51-11	0.0	5.2
M.9 NAKBT337	0.3	4.7
M.9 Pajam 2	0.0	5.9
M.26 EMLA	0.0	10.1
Approximated HSD	2.0	11.2

Table 3. Root suckers (no./tree) in 2011 of Honeycrisp apple trees on various rootstocks in the 2010 NC-140 Honeycrisp Apple Rootstock Trial.

Rootstock	BC	CH	IA	MA	NJ	NY	UT	WI
B.9	0.4	0.2	0.0	0.6	1.0	0.1	0.2	0.0
B.10	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0
B.7-3-150	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
B.7-20-21	0.0	0.9	0.0	0.1	0.0	0.0	0.0	0.1
B.64-194	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0
B.67-5-32	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0
B.70-6-8	0.0	0.4	0.0	0.1	0.4	0.0	0.0	0.0
B.70-20-20	0.0	1.1	0.1	0.3	0.6	0.1	0.0	0.0
B.71-7-22	1.0	0.5	0.0	0.0	0.2	0.8	0.3	0.2
G.11	0.1	0.3	0.0	0.7	0.3	0.0	0.0	0.1
G.41N	0.0	0.7	0.0	0.1	0.0	0.0	0.0	0.0
G.41TC	0.0	0.8	0.0	1.0	0.0	0.0	0.0	0.0
G.202N	1.4	0.7	0.0	2.5	0.8	0.5	0.0	0.2
G.202TC	0.0	6.0	0.0	0.3	1.8	0.0	0.0	0.0
G.935N	0.1	0.6	0.1	0.4	0.4	0.0	0.1	0.0
G.935TC	0.0	1.3	0.0	2.5	0.0	0.0	0.0	0.0
CG.2034	0.4	0.8	0.0	0.3	0.0	0.3	0.0	0.0
CG.3001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CG.4003	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0
CG.4004	1.3	0.3	0.0	1.8	0.5	0.5	0.0	0.0
CG.4013	0.5	1.5	0.0	0.0	0.0	0.8	0.0	0.0
CG.4214	1.0	1.7	0.0	1.1	0.9	0.5	0.3	0.3
CG.4814	0.4	1.2	0.0	2.0	2.0	0.1	0.0	0.2
CG.5087	0.0	1.0	0.0	0.7	0.3	1.7	0.7	0.0
CG.5222	1.0	0.8	---	1.4	0.8	1.3	0.0	0.0
Supp.3	0.5	0.2	0.0	0.2	0.2	0.3	0.0	0.2
PiAu 9-90	0.0	1.2	0.2	0.0	0.0	0.0	0.0	0.0
PiAu 51-11	0.0	0.3	0.1	0.0	0.1	0.2	0.1	0.0
M.9 NAKBT337	0.3	0.7	0.2	1.3	2.0	0.8	0.3	0.1
M.9 Pajam 2	0.8	0.8	0.0	2.5	5.3	0.6	0.3	0.7
M.26 EMLA	0.2	1.7	0.0	0.7	0.3	0.4	0.0	0.0
Approximated HSD	1.6	2.3	0.4	2.4	2.4	1.6	0.7	0.6

Table 4. Trunk cross-sectional area (cm^2) at the end of the 2011 growing season of Honeycrisp apple trees on various rootstocks in the 2010 NC-140 Honeycrisp Apple Rootstock Trial.

Rootstock	BC	CH	IA	MA	MI	NJ	NS	NY	UT	WI
B.9	3.2	3.9	2.5	2.4	2.0	3.3	2.7	2.9	3.0	3.3
B.10	3.8	4.5	3.6	3.8	3.1	5.2	3.8	5.7	3.2	4.3
B.7-3-150	4.7	5.3	5.6	3.7	2.6	7.4	4.2	4.8	4.5	4.3
B.7-20-21	7.0	5.7	6.0	5.0	4.6	10.2	6.9	6.7	5.3	6.7
B.64-194	5.1	6.1	6.2	5.2	5.1	9.2	7.0	5.5	5.7	7.5
B.67-5-32	5.9	4.9	5.3	4.5	4.3	7.1	4.3	4.9	4.8	5.3
B.70-6-8	5.2	4.7	5.2	4.7	3.3	7.5	4.7	5.9	4.9	4.5
B.70-20-20	10.2	6.9	8.2	8.0	7.1	15.7	8.7	8.3	8.0	9.3
B.71-7-22	1.2	3.3	1.4	1.0	0.9	1.8	1.1	1.4	1.4	1.3
G.11	4.1	4.4	4.1	3.1	3.1	5.1	3.8	4.1	4.3	3.7
G.41N	4.8	4.4	3.5	3.0	2.4	5.3	3.7	4.5	2.8	4.5
G.41TC	3.6	3.6	3.6	2.7	2.6	4.9	3.4	2.9	3.4	3.1
G.202N	6.9	6.5	6.0	5.5	4.6	9.8	6.5	6.2	5.1	6.1
G.202TC	4.9	6.4	4.7	5.1	4.0	6.5	4.8	6.3	5.5	2.9
G.935N	6.0	5.1	4.3	4.5	4.3	6.2	4.8	6.0	4.1	5.6
G.935TC	3.8	4.1	3.3	3.8	3.8	7.9	6.0	4.7	2.8	3.8
CG.2034	4.5	4.5	2.9	2.5	2.5	4.4	3.7	3.0	4.2	3.5
CG.3001	6.4	5.4	6.2	5.9	4.0	8.3	5.9	6.6	6.2	4.5
CG.4003	3.3	3.8	3.3	2.9	2.6	5.0	4.1	4.2	3.0	4.2
CG.4004	6.7	4.4	5.0	4.7	4.2	9.0	6.0	6.3	4.8	6.0
CG.4013	3.9	5.2	4.4	4.0	3.2	6.0	2.1	5.5	3.6	2.5
CG.4214	4.1	4.7	3.9	3.5	3.3	6.2	3.7	4.8	3.1	3.8
CG.4814	6.3	5.2	5.0	3.8	4.2	8.2	5.4	5.9	3.5	4.9
CG.5087	6.1	5.9	4.2	3.8	3.6	8.1	4.2	6.7	3.4	5.1
CG.5222	6.1	4.4	---	5.0	4.1	8.3	6.6	6.3	4.4	4.7
Supp.3	4.2	4.0	3.1	3.3	1.9	5.6	3.5	4.5	4.0	3.3
PiAu 9-90	6.5	5.7	5.4	6.6	4.8	11.4	5.0	7.8	7.6	6.5
PiAu 51-11	4.9	5.5	5.2	5.3	3.8	9.3	3.8	6.0	4.8	4.6
M.9 NAKBT337	3.8	4.8	3.6	3.8	2.5	5.9	3.3	4.2	3.7	4.1
M.9 Pajam 2	4.9	4.6	4.0	3.4	3.3	6.5	4.2	4.8	4.4	5.3
M.26 EMLA	5.0	4.3	4.7	3.5	3.1	5.7	3.9	4.7	4.0	4.2
Approximated HSD	1.6	2.2	1.6	1.6	1.5	1.8	2.1	1.9	2.2	1.6

Table 5. Trunk cross-sectional area (October 2010 and 2011), number of branches at planting(>10cm), union height at planting, blossom density in 2011, and root suckers in 2011 of Aztec Fuji apple trees in the 2010 NC-140 Fuji Apple Rootstock Trial.[z]

Rootstock	Trunk cross sectional area at planting (cm^2)	Branches at planting (no. > 10cm)	Graft union height at planting (cm)	Trunk cross-sectional area (cm^2, 2010)	Blossom density (no. clusters/cm^2, 2011)	Root suckers (no., 2011)	Trunk cross-sectional area (cm^2, 2011)
B.9	1.5 fg	2.6 ghi	12.7 abc	2.6 gh	2.8 bcd	0.2 ab	5.6 ef
B.10	2.0 de	5.4 f	12.9 abc	3.2 efg	1.0 de	0.1 b	7.5 d
B.7-3-150	2.4 bc	5.0 f	13.0 abc	3.8 cd	1.2 de	0.1 b	8.9 cd
B.7-20-21	1.0 hi	1.7 hi	13.7 a	1.4 i	5.9 b	0.3 ab	2.4 g
B.64-194	1.7 ef	4.4 fg	13.0 abc	2.8 g	1.4 de	0.2 ab	7.3 de
B.67-5-32	1.7 ef	2.7 gh	12.9 abc	3.1 fg	1.0 de	0.1 b	9.0 bcd
B.70-6-8	2.2 cd	4.8 f	13.3 a	3.6 def	1.2 de	0.1 b	9.1 bcd
B.70-20-20	2.6 ab	10.9 ab	11.7 abc	4.9 a	0.2 e	0.4 ab	13.7 a
B.71-7-22	0.8 i	0.5 i	11.4 abc	1.3 i	4.6 bc	0.5 ab	2.6 g
G.11	1.6 f	6.9 def	13.5 a	3.2 efg	1.9 cde	0.0 b	7.6 d
G.202N	2.7 ab	11.6 ab	13.0 abc	4.1 bcd	0.5 de	0.5 ab	9.3 bcd
G.202TC	2.2 cd	10.6 ab	12.2 abc	3.8 cd	0.6 de	0.4 ab	8.5 cd
G.935N	2.7 ab	11.7 ab	12.9 abc	3.8 cd	0.6 de	0.4 ab	9.0 bcd
G.935TC	2.0 de	10.4 abc	10.4 c	3.1 fg	1.6 cde	0.6 ab	8.4 cd
CG.3001	2.0 de	9.9 abcd	11.2 abc	4.2 abcd	1.0 de	0.2 ab	9.4 bcd
CG.4003	1.5 fg	5.7 ef	12.9 abc	2.6 gh	1.7 cde	0.2 ab	5.6 ef
CG.4004	1.9 def	11.7 ab	12.3 abc	3.3 defg	0.3 e	0.3 ab	8.3 cd
CG.4214	1.2 gh	4.2 fgh	14.0 a	2.1 h	9.0 a	0.1 b	4.5 f
CG.4814	2.3 bcd	10.4 abc	11.6 abc	3.6 def	0.8 de	0.8 ab	7.4 de
CG.5222	2.7 ab	8.5 bcd	11.1 bc	4.3 abc	0.6 de	0.9 a	9.5 bc
Supp.3	1.5 fg	4.2 fgh	13.0 abc	2.8 g	3.5 bcd	0.4 ab	6.8 de
PiAu 9-90	2.8 a	12.0 a	13.9 a	5.0 a	0.4 e	0.5 ab	11.1 b
PiAu 51-11	2.8 a	8.2 bcd	12.3 abc	4.4 ab	0.4 e	0.1 b	11.0 b
M.9 NAKBT337	1.8 ef	5.3 f	13.0 abc	3.2 efg	1.7 cde	0.9 a	7.1 de
M.9 Pajam 2	2.1 de	6.0 ef	13.7 a	3.6 def	1.7 cde	0.8 ab	8.2 cd
M.26 EMLA	2.0 de	8.0 cde	13.1 ab	3.7 de	1.0 de	0.4 ab	9.1 bcd

[z] Least-squares mean separation within column by Tukey's HSD (P = 0.05).

Table 6. Blossom density (no. clusters/ cm^2) in 2011 of Aztec Fuji apple trees on various rootstocks in the 2010 NC-140 Fuji Apple Rootstock Trial.

Rootstock	KY	PA
B.9	5.5	0.1
B.10	1.2	0.8
B.7-3-150	1.9	0.6
B.7-20-21	4.5	7.1
B.64-194	2.8	0.1
B.67-5-32	1.9	0.0
B.70-6-8	1.9	0.5
B.70-20-20	0.3	0.0
B.71-7-22	7.3	1.9
G.11	3.8	0.1
G.41N	1.2	0.0
G.41TC	3.0	0.0
G.202N	0.7	0.0
G.202TC	1.0	0.3
G.935N	1.2	---
G.935TC	3.3	0.0
CG.2034	6.8	1.7
CG.3001	2.0	0.3
CG.4003	3.5	0.0
CG.4004	0.7	0.0
CG.4013	1.6	0.3
CG.4214	3.8	14.4
CG.4814	1.6	0.0
CG.5087	1.6	---
CG.5222	0.5	0.6
Supp.3	5.9	1.1
PiAu 9-90	0.9	0.0
PiAu 51-11	0.7	0.2
M.9 NAKBT337	2.7	0.7
M.9 Pajam 2	3.4	0.1
M.26 EMLA	2.1	0.0
Approximated HSD	3.1	5.1

Table 7. Root suckers (no./tree) in 2011 of Aztec Fuji apple trees on various rootstocks in the 2010 NC-140 Fuji Apple Rootstock Trial.

Rootstock	CH	KY	NC	PA	UT
B.9	0.1	0.2	0.1	0.2	0.4
B.10	0.1	0.0	0.1	0.2	0.0
B.7-3-150	0.0	0.0	0.3	0.3	0.0
B.7-20-21	0.1	0.6	0.0	0.5	0.2
B.64-194	0.0	0.7	0.0	0.1	0.3
B.67-5-32	0.0	0.2	0.0	0.3	0.1
B.70-6-8	0.2	0.0	0.0	0.3	0.2
B.70-20-20	0.4	0.6	0.3	0.7	0.0
B.71-7-22	0.1	0.5	0.4	1.1	0.3
G.11	0.1	0.0	0.0	0.0	0.0
G.41N	---	0.0	0.3	2.0	0.0
G.41TC	1.0	0.0	0.0	---	0.0
G.202N	0.5	1.0	0.0	0.0	0.5
G.202TC	0.0	0.9	0.6	0.4	0.3
G.935N	0.6	0.4	0.0	0.7	0.2
G.935TC	0.5	0.3	0.2	0.7	1.3
CG.2034	---	0.5	2.0	1.0	0.0
CG.3001	0.0	0.3	0.0	0.7	0.3
CG.4003	0.4	0.1	0.0	0.4	0.0
CG.4004	0.0	0.3	0.3	1.0	0.0
CG.4013	---	0.0	0.0	0.5	0.0
CG.4214	0.0	0.0	0.2	0.6	0.0
CG.4814	1.0	2.8	0.0	0.5	0.3
CG.5087	0.0	0.0	0.0	---	0.0
CG.5222	1.1	0.4	1.1	1.6	0.3
Supp.3	0.0	0.0	0.3	1.5	0.0
PiAu 9-90	0.0	1.3	0.0	1.0	0.0
PiAu 51-11	0.2	0.0	0.3	0.3	0.1
M.9 NAKBT337	0.4	0.8	1.9	0.6	0.7
M.9 Pajam 2	0.8	2.2	0.3	0.4	0.4
M.26 EMLA	0.0	0.0	0.2	0.0	0.0
Approximated HSD	1.3	2.5	1.6	1.8	1.3

Table 8. Trunk cross-sectional area (cm^2) at the end of the 2011 growing season of Aztec Fuji apple trees on various rootstocks in the 2010 NC-140 Fuji Apple Rootstock Trial.

Rootstock	CH	KY	NC	PA	UT
B.9	4.5	6.5	3.5	6.0	7.5
B.10	5.6	10.9	6.6	6.2	8.4
B.7-3-150	6.5	13.4	7.3	7.4	9.8
B.7-20-21	2.2	3.7	1.9	1.6	3.2
B.64-194	5.7	10.7	7.9	5.6	7.5
B.67-5-32	5.2	13.2	8.9	8.2	9.8
B.70-6-8	5.8	13.8	9.0	7.2	9.7
B.70-20-20	9.0	18.3	17.7	8.9	14.2
B.71-7-22	2.5	3.1	2.3	2.3	3.9
G.11	5.9	12.4	6.8	4.8	8.7
G.41N	---	6.3	6.6	8.9	7.2
G.41TC	4.7	10.9	4.7	---	7.8
G.202N	6.3	16.1	7.2	6.7	8.8
G.202TC	9.9	11.8	6.8	6.7	8.1
G.935N	5.8	14.2	6.6	6.7	11.1
G.935TC	6.6	11.8	7.8	5.9	12.5
CG.2034	---	6.7	2.2	5.7	5.0
CG.3001	8.3	12.7	10.7	6.1	12.1
CG.4003	4.9	7.4	6.2	3.9	7.0
CG.4004	4.6	11.1	8.4	8.0	10.2
CG.4013	---	7.2	3.2	3.2	3.4
CG.4214	4.3	9.1	3.8	2.1	5.7
CG.4814	5.2	13.0	7.3	4.5	7.6
CG.5087	5.2	9.6	3.1	---	5.4
CG.5222	7.2	14.2	9.3	7.1	10.3
Supp.3	4.7	10.8	5.2	6.3	8.4
PiAu 9-90	9.7	20.1	9.4	3.5	13.5
PiAu 51-11	7.4	16.8	10.1	8.6	12.9
M.9 NAKBT337	5.1	10.9	7.0	6.0	7.0
M.9 Pajam 2	5.1	13.5	9.0	5.9	9.1
M.26 EMLA	6.1	13.6	9.7	7.0	9.3
Approximated HSD	2.3	5.1	3.6	4.2	3.8