Vineland and Geneva Rootstocks in the 2014 NC-140 Apple Trial at UMass Cold Spring Orchard

Jon M. Clements
Center for Agriculture, Food, & the Environment, University of Massachusetts

Wesley R. Autio
Stockbridge School of Agriculture, University of Massachusetts

A new apple rootstock planting was established in the spring of 2014 at the UMass Cold Spring Orchard, Belchertown, MA. As part of the NC-140 Regional Rootstock Research Project (http://nc140.org), Objective 1 is "To evaluate the influence of rootstocks on temperate-zone fruit tree characteristics grown under varying environments using sustainable management systems." In this case, the growth and productivity of Honeycrisp apple trees on Vineland and Geneva apple rootstocks.

This Vineland-Geneva planting is being coordinated by Dr. John Cline, University of Guelph, Ontario, Canada. Vineland rootstocks were bred as open-pollinated hybrids of Kerr crabapple and M.9 rootstock at the Vineland Experiment station in Vineland, Ontario. They include V.1, V.2, V.3, V.4, V.5, V.6, and V.7. V.1 is already commercially available and is similar in vigor to M.26. V.3 is more dwarfing but is not yet commercially available. V.4 will not be commercialized, as may be the case for V.2 also. V.5, V.6, and V.7 are largely untested, although it is known V.5 and V.6 are dwarfing, while V.7 is a semi-dwarf. Vineland rootstocks are purported to be very cold-hardy and display field-resistance to fire blight. V.1 and V.3 have been tested in previous NC-140 plantings and have performed well. In Massachusetts, we evaluated V.1 and V.3 with McIntosh, Pioneer Mac, Macoun, and Cortland in a 1995 planting (*Fruit Notes* Volume 70 Number 1: http://umass-fruitnotes.com/v70n1/fn701-a1.pdf). We also evaluated V.1, V2, V.3, and V.7 in a 1996 planting with McIntosh (*Fruit Notes* Volume 71 Number 1: http://umassfruitnotes.com/v71n1/a2.pdf).

The 2014 NC-140 Vineland/Geneva Apple Rootstock Planting, UMass Cold Spring Orchard, October, 29, 2014.

Geneva rootstocks are better known and more widely available, although supply has been constrained to date. For more information on the commercially available Cornell-Geneva rootstocks, see: http://www.cctec.cornell.edu/plants/GENEVA-Apple-Rootstocks-Comparison-Chart-120911.pdf.

Table 1. Trunk cross-sectional area (TCA, cm) of trees on Vineland and Geneva rootstocks.

Rootstock	TCA (cm) May	TCA (cm) October	TCA increase (cm) Oct-May
G.30	2.4 a	3.8 a	1.4
G.5890	2.3 ab	3.8 a	1.5
V.6	2.0 bc	3.8 a	1.8
V.1	1.9 c	3.2 ab	1.3
G.4214	1.6 d	2.3 cd	0.7
V.5	1.6 d	3.0 b	1.4
V.7	1.6 de	2.8 bc	1.2
G.969	1.3 ef	2.2 cd	0.9
M.26	1.2 efg	2.0 de	0.8
M.9 NAKBT337	1.2 efg	1.9 de	0.7
G.935	1.0 fg	2.0 de	1.0
G.41	0.9 gh	1.8 de	0.9
G.11	0.9 gh	1.6 ef	0.7
G.202	0.7 h	1.1 f	0.4

Within column, numbers not followed by same letter significantly different at odds of 20:1(Tukey's HSD, *P* = 0.05).

Table 2. Height (m) of trees on Vineland and Geneva rootstocks.

Rootstock	Tree height May (m)	Tree height October (m)	Tree height growth October-May (m)
G.30	2.06 a	2.51 a	0.45
G.5890	2.01 ab	2.39 abc	0.38
G.935	1.95 ab	2.45 ab	0.50
G.4214	1.93 abc	2.26 bcd	0.33
V.1	1.89 bcd	2.35 abc	0.46
G.969	1.76 cde	2.25 bcd	0.49
V.5	1.75 def	2.26 bcd	0.51
G.41	1.74 def	2.18 cde	0.44
V.6	1.72 def	2.27 bcd	0.55
G.11	1.70 ef	2.11 def	0.41
V.7	1.66 ef	2.17 cde	0.51
M.9 NAKBT337	1.63 ef	2.00 ef	0.37
G.202	1.58 fg	1.98 ef	0.40
M.26 EMLA	1.45 g	1.91 f	0.46

Within column, numbers not followed by same letter significantly different at odds of 20:1(Tukey's HSD, *P* = 0.05). at odds of 20:1(Tukey's HSD, *P* = 0.05).

This 2014 NC-140 Vineland and Geneva apple rootstock planting was planted April 29 at the UMass Cold Spring Orchard, Belchertown, MA. Fourteen rootstocks, including four Vineland rootstocks (V.1, V.5, V.6, and V.7), eight Cornell-Geneva rootstocks (G.11, G.30, G.41, G.202, G.935, G.969, G.4214, and G.5890), and two commercial 'standard' rootstocks (M.26 and M.9 NAKBT337) were planted with Honeycrisp as the scion. Trees were supplied by Willow Drive Nursery. Tree spacing is 1 x 4 m. The experimental design is a randomized complete block. Trees were trained and supported as a tall-spindle-apple with trickle irrigation. Tree growth was generally very good and only one tree (G.41) was lost to mechanical injury.

Shortly after planting in May, measurements were made of trunk diameter at 30 cm above the graft union, number of side branches greater than10 cm long, and tree height. In October after tree growth had ceased, measurements were made of trunk circumference at 30 cm above the graft union, height of graft union above soil, number of side branches greater than10 cm long, and tree height.

Results are presented in Tables 1-3 and Figure 1. Most all of the Vineland rootstocks were in the top

Table 3. Number of feathers (branching) greater than10 cm long of trees on Vineland and Geneva rootstocks.

Rootstock	No. feathers > 10 cm, May 2014	No. feathers > 10 cm, October 2014
G.5890	14 a	19 a
G.30	12 ab	16 ab
V.6	11 abc	15 bc
G.4214	10 bc	14 bcd
V.7	8 cd	11 cdef
G.969	6 de	11 def
V.5	6 de	12 cde
V.1	6 de	11 def
M.26	5 ef	8 fgh
M.9 NAKBT337	4 efg	8 fgh
G.41	4 efg	7 gh
G.935	4 efg	10 efg
G.11	2 fg	6 gh
G.202	1 g	6 h

Within column, numbers not followed by same letter significantly different at odds of 20:1(Tukey's HSD, *P* = 0.05).

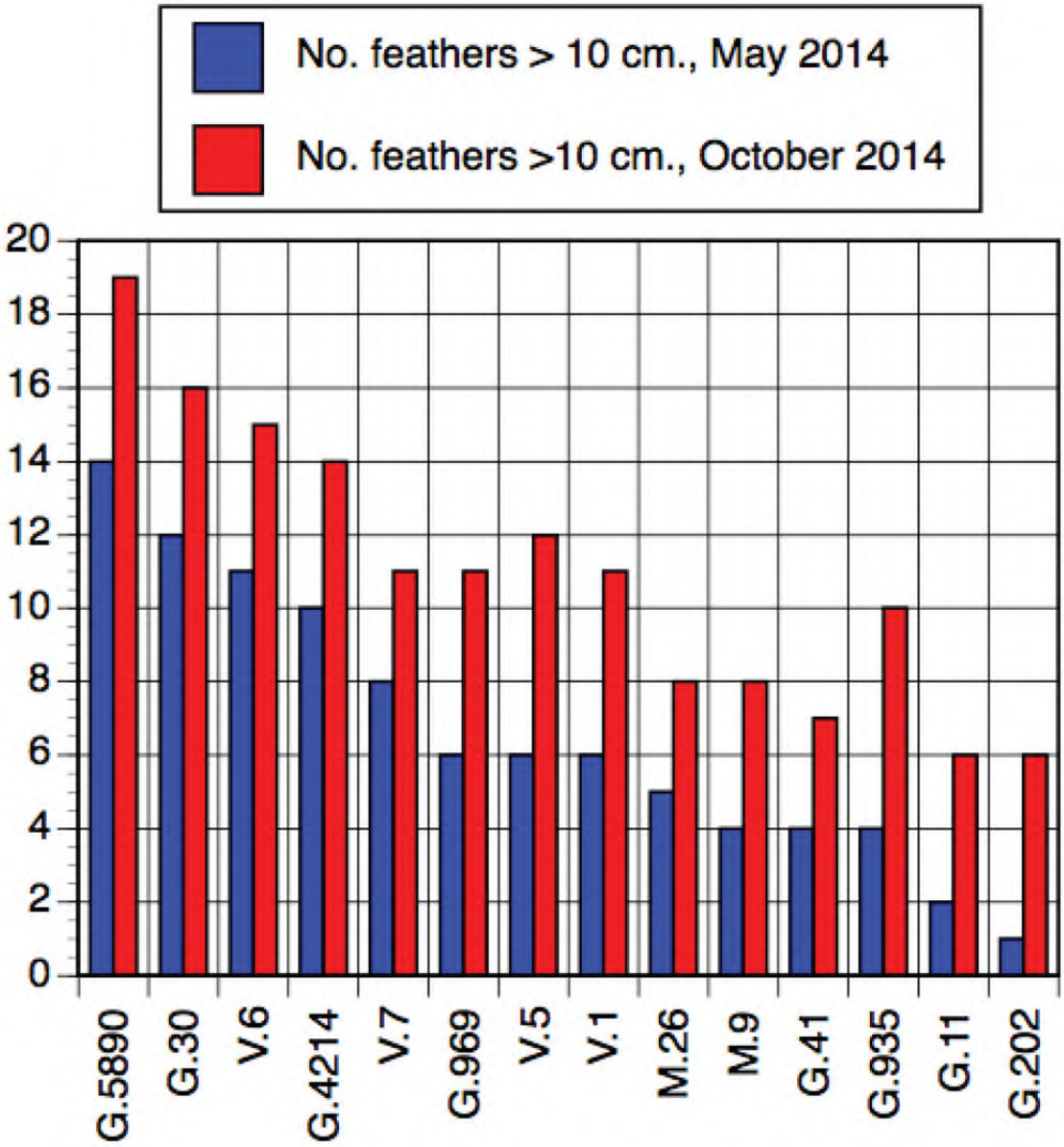

Figure 1. Number of feathers (branching) greater than 10 cm long of tree on Vineland and Geneva rootstocks.

50% in trunk cross-sectional area (TCA), tree height, and branching in spring and at the end of the growing season (Tables 1-3). V.6 and V.7, however, were shorter than the top 50% of rootstocks at planting (Table 2), but they also were among the ones that grew the most in height from May-October. G.30, G.5890, G.4214, and G.969 were the largest of the trees on Geneva rootstocks at planting and at the end of the growing season in TCA, tree height, and feathering, with G.30 and G.5890 standouts. G.41, G.11, and G.202 were among the smallest trees, weakest growers with low number of feathers, similar to the standard rootstocks M.9 and M.26.

It should be noted that tree size at planting pretty much followed through the first growing season. Larger trees at planting will grow better during the first season and be larger trees at the end of the growing season. This should result in a crop in the second season. Tree size at planting is likely indicative of overall rootstock vigor, and will probably reflect in tree size during the life of the orchard (to be determined).

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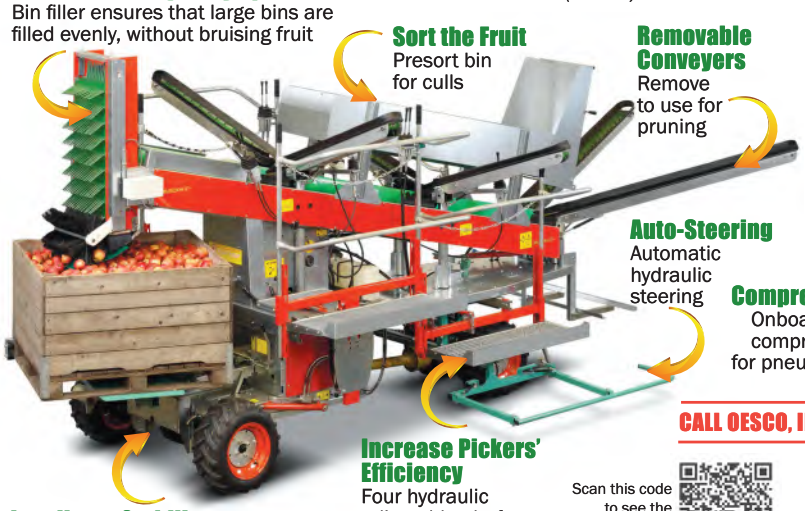

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