Performance of McIntosh Apple Trees on One Pillnitz and Three Geneva Semidwarfing Rootstocks: Nine-year Summary of the Massachusetts Planting of the 1999 NC-140 Semidwarf Apple Rootstock Trial

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As a companion to the experiment reported in the previous *Fruit Notes* article, a second NC-140 trial was established in 1999, including three rootstocks from the Cornell-Geneva Apple Rootstock Breeding Program (a cooperative effort between Cornell University and the United States Department of Agriculture). G.30 and two yet unnamed rootstocks (CG.4814 and CG.7707) from the program were included. Supporter 4 rootstock was released from the Institut für Obstforschung Dresden-Pillnitz in Germany and was included in this trial. M.7 EMLA and M.26 EMLA served as the standards. Like the dwarf trial, McIntosh was the scion variety, and this trial was established at several locations throughout North America, but only the Massachusetts results are reported here.

Trees were spaced 4x6m and not supported unless they leaned more than 45° from vertical. The experiment was replicated six times at the University

Table 1. Trunk cross-sectional area, suckering, yield, yield efficiency, and fruit weight in 2007 of McIntosh trees on several rootstocks in the Massachusetts planting of the 1999 NC-140 Semidwarf Apple Rootstock Trial.[z]

Rootstock	Trunk cross-sectional area (cm^2)	Root suckers (no./tree, 1999-2007)	Yield per tree (kg)		Yield efficiency (kg/cm^2 TCA)		Fruit weight (g)	
			2007	Cumulative (2001-07)	2007	Cumulative (2001-07)	2007	Average (2001-07)
CG.4814	38.2 b	25.2 b	33.3 b	174 b	0.89 a	4.56 a	173 ab	170 a
CG.7707	46.0 b	5.6 b	41.5 ab	183 ab	0.90 a	4.01 ab	142 c	165 a
G.30	85.8 a	17.3 b	51.1 ab	255 a	0.60 a	2.99 bcd	181 a	164 a
M.26 EMLA	43.1 b	3.2 b	50.0 ab	149 b	1.14 a	3.44 bc	159 bc	165 a
M.7 EMLA	98.8 a	73.8 a	68.1 a	210 ab	0.71 a	2.17 d	165 ab	169 a
Supporter 4	82.2 a	10.2 b	53.4 ab	197 ab	0.68 a	2.50 cd	172 ab	168 a

[z] Means within columns not followed by a common letter are significantly different at odds of 19 to 1 (Tukey's HSD, $P = 0.05$).

of Massachusetts Cold Spring Orchard Research & Education Center.

At the end of nine growing seasons, rootstocks fell into two groups regarding their effects on tree size (trunk cross-sectional area, Table 1). Trees on M.7 EMLA, G.30, and Supporter 4 were statistically comparable in size, with those on M.7 EMLA being numerically larger. Trees on M.26 EMLA, CG.4814, and CG.7707 were, likewise, comparable in size. Root suckering (Table 1) was most dramatic from M.7 EMLA. G.30 resulted in less than one fourth the number of suckers as seen with M.7 EMLA.

Cumulative yield (2001-07, Table 1) was greatest from trees on G.30 and least from those on CG.4814 and M.26 EMLA. Trees on CG.4814 resulted in the greatest cumulative yield efficiency, followed by those on CG.7707, M.26 EMLA, G.30, Supporter 4, and M.7 EMLA in decreasing order. Yield efficiency estimates the relative per-acre yield which might be obtained once these trees are planted at an appropriate spacing. Within the group of smaller trees, it is clear that CG.4814 outyielded M.26 EMLA. Within the group of larger trees, G.30 outyielded M.7 EMLA, although the difference was not statistically significant. Fruit size averaged over the fruiting life of this trial was not affected by rootstock (Table 1).

Based on these Massachusetts data, the true semidwarf rootstocks which deserve further consideration are G.30 and Supporter 4. Both performed well, but G.30 was somewhat better. There is a concern, however, about the brittleness of the G.30 graft union, so it is necessary to consider some type of trunk support to protect the union from breakage. At this point, CG.4814 looks very interesting as a large dwarf, but the Cornell-Geneva Breeding Program does not have any plans for its release at this time.

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