# Performance of McIntosh Apple Trees on Several Geneva and Pillnitz Dwarfing Rootstocks: Nine-year Summary of the Massachusetts Planting of the 1999 NC-140 Dwarf Apple Rootstock Trial

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Choice of the correct rootstock for the chosen system and variety can greatly enhance the economic success of any apple orchard block. The NC-140 Multistate Research Committee is a group of scientists from throughout the U.S., Canada, and Mexico charged with evaluating rootstock performance and physiology and addressing the process of selecting the correct rootstock. The results reported here are from nine years of the Massachusetts planting of an NC-140 trial planted at several locations in the U.S. and Canada.

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 Dwarf 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) |
| G.41 | 54.0 bcd | 2.9 b | 46.1 ab | 183 bc | 0.85 a | 3.41 abc | 180 a | 167 ab |
| CG.4013 | 89.5 a | 14.3 a | 67.9 a | 287 a | 0.76 a | 3.27 abc | 176 ab | 162 ab |
| CG.5179 | 60.4 bc | 14.3 a | 47.0 ab | 232 ab | 0.82 a | 3.90 abc | 169 ab | 159 ab |
| G.202 | 65.5 ab | 2.5 b | 56.3 ab | 233 ab | 0.86 a | 3.65 abc | 177 ab | 164 ab |
| G.16N | 43.5 bcd | 0.0 b | 26.3 b | 121 c | 0.64 a | 2.81 c | 150 b | 161 ab |
| G.16T | 41.3 bcd | 2.5 b | 49.1 ab | 161 bc | 1.19 a | 3.96 abc | 156 ab | 156 ab |
| M.26 EMLA | 50.5 bcd | 0.0 b | 51.8 ab | 157 bc | 1.07 a | 3.17 bc | 170 ab | 164 ab |
| M.9 NAKBT337 | 32.7 d | 5.5 ab | 32.2 b | 112 c | 1.07 a | 3.53 abc | 180 a | 173 a |
| Supporter 1 | 31.3 d | 0.2 b | 36.2 b | 139 c | 1.17 a | 4.40 ab | 170 ab | 162 ab |
| Supporter 2 | 35.8 d | 1.7 b | 37.0 b | 157 bc | 1.02 a | 4.37 ab | 169 ab | 148 b |
| Supporter 3 | 40.5 cd | 4.3 b | 43.3 ab | 179 bc | 1.07 a | 4.42 a | 175 ab | 158 ab |

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

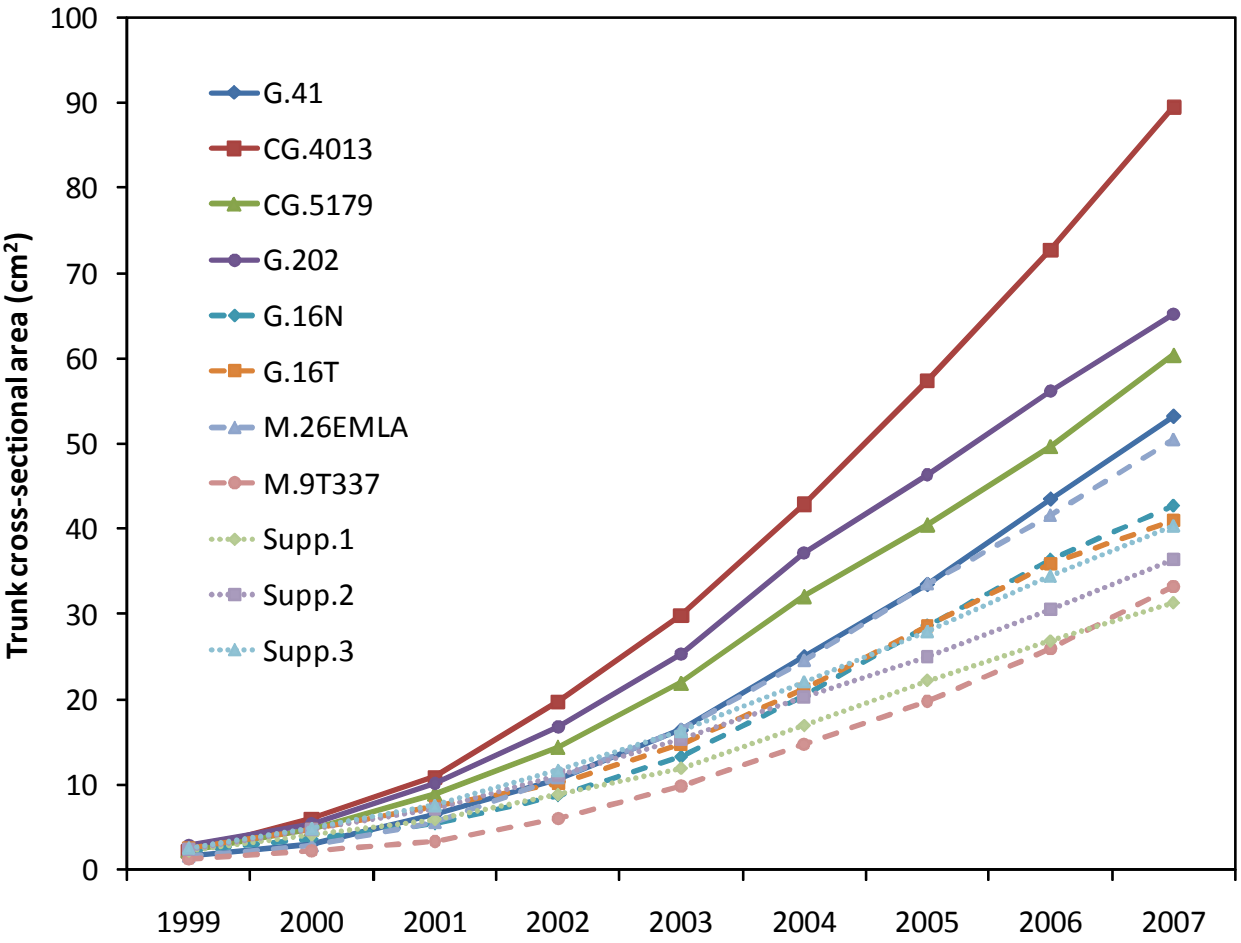



Figure 1. Annual (1999-2007) trunk cross-sectional area of McIntosh trees on several rootstocks in the Massachusetts planting of the 1999 NC-140 Dwarf Apple Rootstock Trial.

Rootstocks in this trial include five individuals from the Cornell-Geneva Apple Rootstock Breeding Program (a cooperative effort between Cornell University and the United States Department of Agriculture). G.16N and G.16T are two forms of G.16 (N liners were from normal stool beds and T liners were from tissue-culture-based stool beds). G.41 and G.202 are new releases from the Cornell-Geneva Program, and the two CG rootstocks are as yet unnamed rootstocks from the same program. The three Supporter rootstocks were released from the Institut für Obstforschung Dresden-Pillnitz in Germany. M.9 NAKBT337 and M.26 EMLA served as the standards in the trial.

The scion cultivar used in this trial is McIntosh, and trees were trained a vertical axes, spaced 3x5m. Support was provided by a 10-foot conduit pipe supported at about 7 feet from the soil surface with a horizontal wire. The experiment was replicated six times at the University of Massachusetts Cold Spring Orchard Research & Education Center.

At the end of nine growing seasons, dramatic differences in tree size had developed in this trial (Table 1, Figure 1). CG.4013, CG.5179, and G.202 produced the largest trees, all numerically larger on average than trees on M.26 EMLA. Trees on CG.4013 clearly were in the semidwarf category. Trees on G.41 were statistically similar to those on G.16 and M.26 EMLA but were numerically larger. Trees on Supporter 3 were

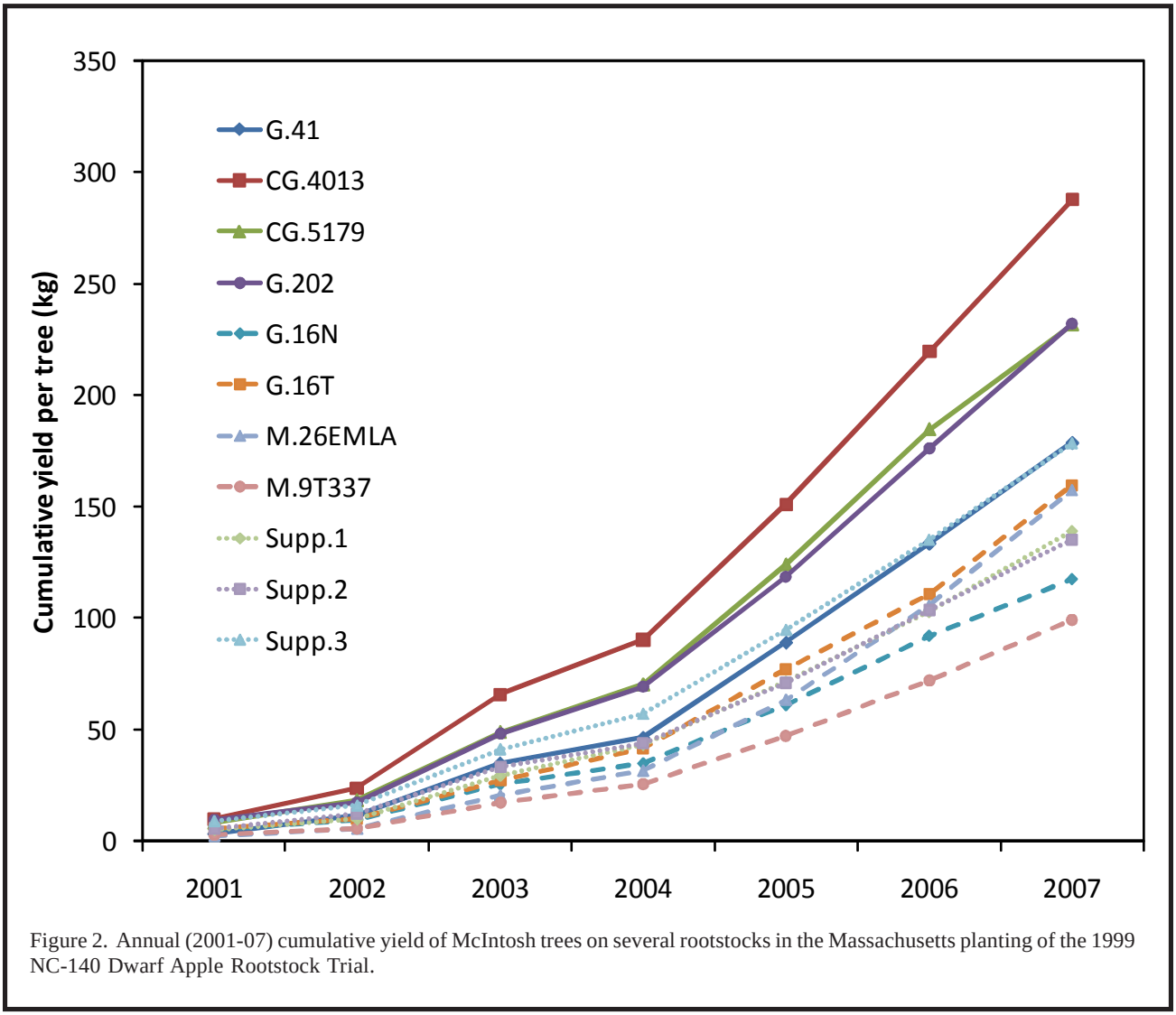


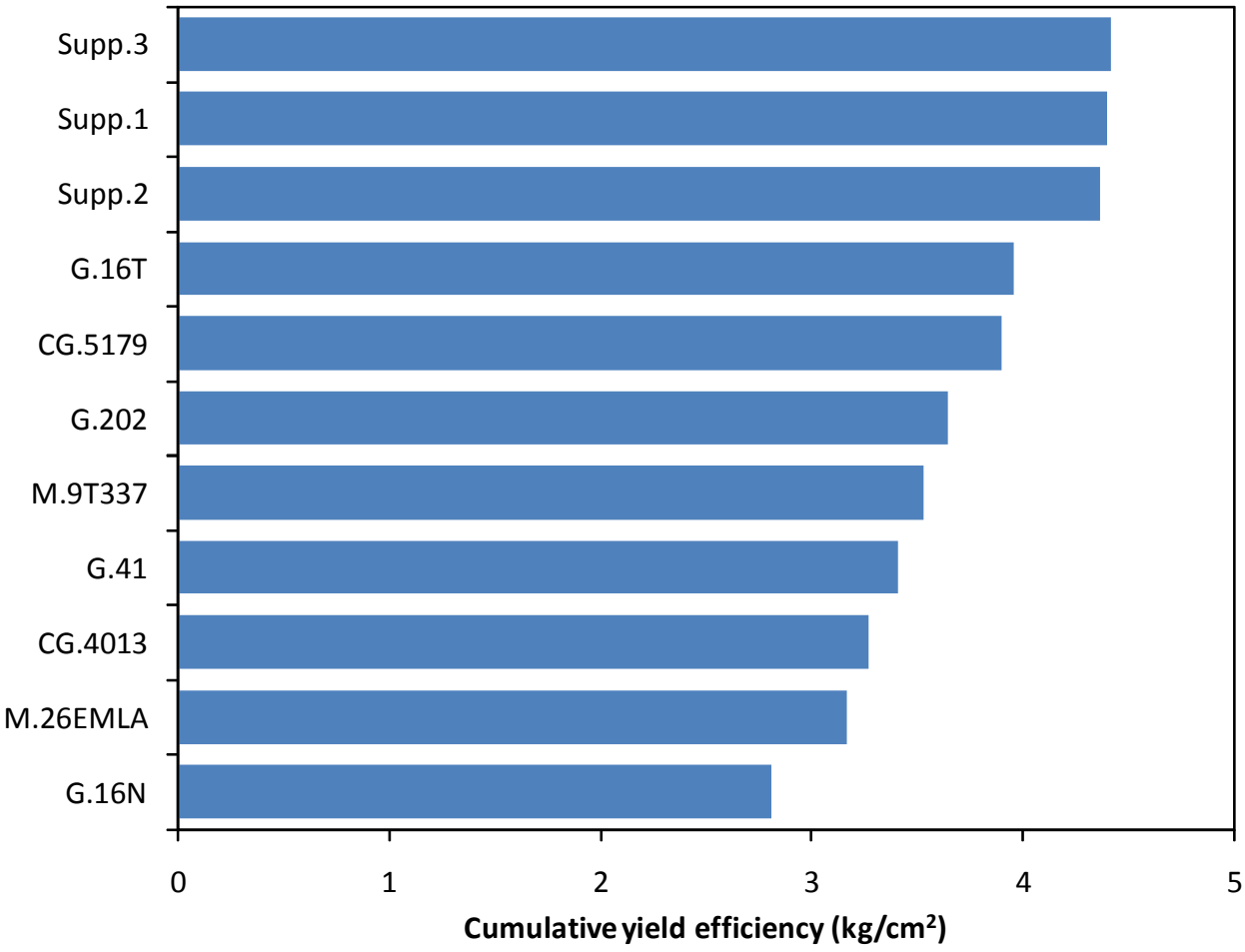

Figure 2. Annual (2001-07) cumulative yield of McIntosh trees on several rootstocks in the Massachusetts planting of the 1999 NC-140 Dwarf Apple Rootstock Trial.

similar in size to those on G.16. The smallest trees were on Supporter 1, Supporter 2, and M.9 NAKBT337. Root suckering was relatively low for all rootstocks, but was most prominent from CG.4013 and CG.5179 (Table 1).

Yield in 2007 or cumulatively (2001-07) was roughly related to tree size, with the largest trees producing the greatest yields (Table 1, Figure 2). When you adjust yield for tree size (for instance, calculate yield efficiency), the picture changes somewhat (Table 1, Figure 3). Clearly, the most yield efficient trees (an estimate of how yield may vary on a per-acre basis) were on the Supporter rootstocks. The least efficient trees were on G.16 from normal stool-bed liners. It is unclear why this occurred. Trees on M.26 EMLA were the next least yield efficient in the trial.

Fruit size was somewhat affected by rootstock. M.9 NAKBT337 resulted in the largest fruit on average over the fruiting life of the trial, and Supporter 2 resulted in the smallest fruit (Table 1).

Based on these Massachusetts data, the rootstocks that deserve further consideration are G.41 and G.16 in the large dwarf category and Supporter 1 and Supporter 3 in the small dwarf category. All resulted in good yields of fruit of good size. This trial will be maintained for one more growing season before its termination.

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