2003 NC-140 Dwarf Apple Rootstock Trial Performance in 2007

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Introduction

To evaluate the adaptability and performance of new and promising apple rootstocks in the dwarfing size-control category, a NC-140 regional rootstock trial was established in 2003 at 15 sites in the United States (AR, CA, IA, GA, KY, ME, MI, NY, OH, PA, UT, VA, WI), Canada (BC), and Mexico. The Iowa planting, located at the ISU Horticulture Research Station, includes 23 rootstocks with new selections from the Cornell-Geneva breeding program (G, CG.), Russia (B.), Czech Republic (J-TE), Japan (JM.), and Germany (PiAu). These rootstocks are being evaluated with Gibson Golden Delicious serving as the test cultivar. This report summarizes the tree-growth and production characteristics through the 2007 growing season.

Materials and Methods

The trees were planted at a 8.2 × 16 ft spacing as two-tree plots in a randomized complete block design replicated four times (8 trees/rootstock with PiAu 36-2, JM.10, JM.5, and JM.8 tested with less than a full complement of trees). Pacific Gala/B.9 trees were planted between each block and at the ends of the rows as pollinators. Trees are being trained to a vertical axis using a 3/4-in. metal conduit for support.

Results and Discussion

After five growing seasons, differences in tree size among rootstocks continue to be evident (Table 1). Based on trunk diameter, the trees appear to have separated into four size ranges: semi-vigorous (PiAu 51-4, PiAu 56-83, JM.5, PiAu 36-2, and JM.2,); semi-dwarf (CG.6210, JM.4, JM.8, PiAu 51-11, J-TE-H, and CG.5935); dwarf (M.26, JM.7, B.62-396, CG. 5179, JM.10, M.9 Pajam 2, M.9 T337, G.16, JM.1, and CG.3041); and very dwarf (B.9 and J-TE-G). Some differences in the ranking have occurred since 2006 due to the influences of crop load. In addition, three trees on JM.7 and one each on JM.1, JM.5, and JM.8 were omitted from the data because they exhibit atypical growth and yield characteristics.

Although no rootstocks have exhibited excessive suckering, sucker counts more than doubled compared with 2006 counts for trees on PiAu 51-11, M.9 Pajam 2, M.9 T337, B.9, CG.6210, and CG.5179. Suckering often increases after winter injury to apple tree trunks has occurred. On January 16, the trees were exposed to -13.5^{o}F following a prolonged period of above freezing temperatures that were not conducive for inducing good plant acclimation and cold hardiness.

On April 7, when the buds were near the green-tip stage of development, the trees were exposed to 12^{o}F. Most king and advanced lateral blossoms were killed leaving one to three blossoms per cluster. Because of a freeze that occurred during bloom in 2005, 2006 was the first year for significant yields in this trial. For trees on rootstocks that produced high yields in 2006, only trees on CG.5179 and J-TE-G had below normal blooms in 2007 (Table 1). Trees on JM.5, PiAu 56-83, and PiAu 36-2, which produced little or no fruit in 2006, exhibited a below normal bloom.

Based on yield efficiency in 2007 and on a cumulative basis, trees on JM.7, J-TE-G, CG.5935, B.9, and G.16 have been the most productive, while trees on JM.5, PiAu 56-83, and PiAu 36-2 remain the least productive. Within the “semi-vigorous” size range, trees on JM.2 have been the most productive. Within the

"semi-dwarf" and "dwarf" size ranges, trees on JM.4 and JM.10 have been the least productive.

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Table 1. Growth, bloom, and fruit yield characteristics of Golden Delicious apple trees on 23 rootstocks in the Iowa planting of the 2003 NC-140 dwarf apple rootstock trial for 2007.

	Trunk dia.	Tree height	Tree spread	# of suckers	Bloom	Fruit yield		Cumulative Yield	Cumulative Yield
Rootstock	(in)	(ft)	(ft)	/tree	rating[z]	(lb/tree)	Yield eff.[y]	(lb/tree)	eff.[y]
PiAu 51-4	3.10	12.5	8.6	.0	3.6	37.4	.34	41.2	.37
PiAu 56-83	3.05	12.8	9.0	.0	2.3	15.6	.15	15.8	.15
JM.5	3.02	11.9	8.3	.0	2.2	12.5	.12	12.5	.12
PiAu 36-2	3.01	12.9	9.8	.0	2.7	31.1	.31	33.2	.33
JM.2	2.99	12.9	9.0	.9	4.0	45.4	.44	64.2	.63
CG.6210	2.52	11.5	8.4	1.4	4.3	45.6	.64	66.1	.93
JM.4	2.43	10.7	6.8	.0	3.0	16.9	.24	19.5	.29
JM.8	2.41	11.3	8.3	.3	4.3	45.0	.69	66.3	1.02
PiAu 51-11	2.39	10.3	7.4	4.4	4.6	32.5	.50	43.0	.67
J-TE-H	2.35	10.4	8.6	.3	3.8	31.3	.52	55.8	.91
CG.5935	2.35	10.4	8.3	1.1	4.0	47.8	.76	78.9	1.24
M.26	2.24	10.6	7.5	.3	4.5	31.0	.55	44.8	.80
JM.7	2.21	9.5	7.5	.3	4.3	53.1	.94	79.4	1.41
B.62-396	2.19	10.9	7.3	.1	3.6	23.9	.43	45.9	.84
CG.5179	2.18	9.9	7.6	1.4	2.6	21.2	.40	47.6	.89
JM.10	2.11	10.2	6.2	.8	4.0	17.9	.34	20.5	.39
M.9 Pajam2	2.07	9.7	7.2	4.4	3.6	30.5	.62	49.7	1.01
M.9 T337	2.04	9.6	7.0	3.6	3.0	26.6	.59	48.5	1.04
G.16	2.01	9.2	6.8	.4	4.0	31.8	.71	54.4	1.20
JM.1	2.01	9.0	7.0	.3	3.5	20.4	.46	41.5	.92
CG.3041	1.88	9.4	6.6	.0	3.0	26.3	.66	45.7	1.13
B.9	1.46	8.3	6.1	2.4	3.8	16.2	.69	29.9	1.24
J-TE-G	1.45	7.9	5.5	.0	2.8	18.2	.79	31.5	1.34
LSD (P < .05)	.27	1.0	1.0	1.9	1.0	10.7	.20	12.3	.22

[z]Bloom rating: 0 = failed to bloom; 1 = very light; 2 = light, 3 = normal, 4 = heavy, 5 = very heavy.

[y]Yield efficiency is reported in kilograms of fruit per cm^2 of the trunk cross-sectional area. Higher values indicate more productive trees.