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2003 NC-140 Dwarf Apple Rootstock Trial Performance in 2009

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Abstract
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 14 sites in the United States (AR, CA, IA, GA, KY, ME, MI, NY, OH, PA, UT, 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) with M.26, M.9 Pajam 2, and M.9 T337 serving as industry standards. 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 2009 growing season.

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RFR-A9003

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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 14 sites in the United States (AR, CA, IA, GA, KY, ME, MI, NY, OH, PA, UT, 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) with M.26, M.9 Pajam 2, and M.9 T337 serving as industry standards. 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 2009 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 seven growing seasons, differences in tree size among rootstocks continue to be evident (Table 1). Even with light crop loads in 2008, trees on JM.5 and PiAu 56-83 failed to come back with a normal bloom and remain the least productive. Based on trunk cross sectional area, trees have separated into 4 size groupings: PiAu 51-4, PiAu 56-83, JM.5 PiAu 36-2, and JM.2 being the largest and in a semi-vigorous size range; JM.4, CG.6210, PiAu 51-11, JM.8, M.26, J-TE-H, CG.5935, and JM.10 in the M.26-size range; Bud.62-396, CG.5179, JM.7, M.9 Pajam2, M.9 T337, G.16, CG.3041, and JM.1, in the M.9-size range; and J-TE-G and B.9 in the smallest size range. Suckering has not been a problem with only trees on B.9, CG.6210, and M.9 T337 averaging more than three suckers/tree.

Generally, fruit yields/tree were high, and with the cool growing season, fruit size was well above average with trees on all rootstocks except G.16 producing fruit in the 113 count (6 oz) or higher size range. On a cumulative basis in each size range, trees on JM.2 in the semi-vigorous size range have been the most productive; trees on CG.5935, CG.6210, and JM.8 have been more productive than trees M.26; trees on CG.3041 and JM.7 have been more productive than trees on M.9 T337; and trees on J-TE-G have been more productive than trees on B.9.

Trees in the Iowa planting were exposed to -25^{o}F on January 15, 2009. Tree mortality included one tree each on PiAu 51-11 and J-TE-G that exhibited rootstock bark injury in 2008 and one tree on JM.10 that was girdled by pine voles. In 2008, trees on G.16 began exhibiting symptoms of decline that were thought to be due to wet soil conditions in the spring. During 2009, trees on G.16 continued to exhibit moderate symptoms of decline as early as bloom, and produced smaller fruit

even though the trees only carried moderate crop loads. At this time, the cause of the symptoms is uncertain.

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Table 1. Bloom, growth, and fruit yield characteristics of Gibson Golden Delicious apple trees on 23 rootstocks in the Iowa planting of the 2003 NC-140 dwarf apple rootstock trial for 2009.

		Trunk	Tree	Tree	# of	Tree	Fruit	Avg.		Cumulative	
Rootstock	Bloom rating[z]	dia. (in.)	height (ft)	spread (ft)	suckers /tree	vigor rating[y]	yield (lb/tree)	fruit wt. (oz)	Yield eff.[x]	Yield (lb/tree)	Yield eff.[x]
PiAu 51-4	3.3	4.34	15.0	10.5	1.3	1.0	102.7	7.2	.48	166.8	.77
PiAu 56-83	2.4	4.33	15.4	11.6	.1	1.1	71.8	7.2	.36	114.2	.58
JM.5	2.4	4.24	14.7	10.1	.0	1.0	58.0	6.7	.28	84.5	.41
PiAu 36-2	3.3	4.18	15.4	11.0	.0	1.0	122.9	6.3	.62	177.9	.90
JM.2	3.5	3.97	14.5	10.3	.5	1.0	109.7	6.6	.62	231.6	1.31
JM.4	3.5	3.38	13.5	9.3	.0	1.1	55.5	6.8	.44	92.4	.73
CG.6210	4.1	3.26	12.8	9.7	3.6	1.0	119.2	6.5	.99	258.8	2.16
PiAu 51-11	4.3	3.18	11.5	8.3	1.0	2.0	71.8	6.4	.62	161.5	1.44
JM.8	4.2	3.16	12.9	9.4	.8	1.2	112.4	6.1	1.00	243.0	2.16
M.26	4.4	3.05	12.1	9.2	.5	1.0	88.8	6.9	.85	183.4	1.78
J-TE-H	2.9	3.04	11.3	8.9	.0	1.0	64.4	6.8	.63	188.5	1.82
CG.5935	3.9	3.02	11.5	9.2	.6	1.3	95.0	6.4	.91	238.4	2.29
JM.10	3.8	2.99	12.2	8.4	.0	1.2	56.6	6.5	.57	103.0	1.00
B.62-396	3.5	2.87	11.7	8.8	.1	1.0	87.3	6.8	.93	179.3	1.92
CG.5179	3.7	2.82	11.7	8.7	2.0	1.4	84.9	6.7	.90	190.7	2.09
JM.7	3.0	2.82	10.7	7.9	.8	1.0	90.1	6.3	1.00	232.1	2.58
M.9 Pajam2	3.5	2.72	11.1	8.4	2.4	1.0	81.3	6.3	.96	189.9	2.25
M.9 T337	4.0	2.70	11.0	8.3	3.3	1.0	83.5	6.9	1.00	178.0	2.17
G.16	4.5	2.50	9.3	7.0	.0	3.0	49.8	5.8	.69	153.4	2.16
CG.3041	3.8	2.48	10.8	7.8	.0	1.0	80.3	6.5	1.15	186.2	2.67
JM.1	3.0	2.46	9.5	7.3	.0	2.2	47.3	6.7	.72	133.8	1.99
B.9	3.6	1.81	8.5	6.5	3.9	1.4	40.2	6.3	1.04	102.7	2.70
J-TE-G	4.7	1.80	8.6	6.7	.0	1.6	43.3	6.0	1.17	112.4	3.07
LSD (P < .05)	.8	.40	1.3	1.0	2.2	.6	18.1	.8	.17	31.3	.33

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

[y]Tree vigor rating: 1 = healthy; 2 = leaves slightly off-color; 3 = leaves off-color, some growth suppression; 4 = leaves off-color and small, growth weak; 5 = leaves off-color, small and sparse; growth very weak; 6 = dead.

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