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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 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 (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 2006 growing season.

Keywords

Horticulture

Disciplines

Agricultural Science | Agriculture | Horticulture

2003 NC-140 Dwarf Apple Rootstock Trial Performance in 2006

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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 (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 2006 growing season.

Materials and Methods

The trees were planted in an 8.2 ft × 16 ft area 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-inch metal conduit for support.

Results and Discussion

A freeze during the blooming stage (24°F on May 3) greatly reduced fruit yield in 2005. In 2006, all trees on JM.5, and most trees on PiAu 56-83, PiAu 36-2, PiAu 51-4, JM.10, and JM.4 failed to bloom (Table 1). Trees on G.16, JM.1, B.9, J-TE-G, CG.5935, and CG.5179 had the greatest bloom density ratings. Yield per tree

and yield efficiency values reflected the differences in bloom density with trees on J-TE-G, CG.5179, B.9, CG.3041, CG.5935, and M.9 T337 having the greatest yield efficiencies. There were some differences in average fruit weight between rootstocks with trees on G.16 and JM.4 producing the smallest fruit.

Differences in tree size among rootstocks are evident (Table 1). Based on the cross sectional area of the trunk, the trees appear to be separating into five size groups: large (PiAu 51-4, JM.2, PiAu 36-2, JM.5, and PiAu 56-83); moderately large (JM.8, CG.6210, PiAu 51-11, J-TE-H, JM.4, and CG.5935); medium (M.26, B.62-396, G.16, M.9 Pajam 2, CG. 5179, and JM.1); small (JM.10, M.9 T337, and CG.3041); and very small (B.9 and J-TE-G). Because the trees on M.26 were very small when planted, those trees will probably move into the next larger size group in a few years. Therefore the size groups will probably equate to “large” being trees in the M.7 or larger size range, “moderately large” M.26 to M.7 size range, “medium” larger M.9 clone to M.26 size range, “small” smaller M.9 clone size range, and “very small” M.27 size range.

After four growing seasons, suckering has not been a problem on any of the rootstocks. The trees were exposed to -16°F on December 7, 2005 and -15°F on February 18, 2006. A tree vigor rating performed in August revealed some decline of trees on B.9 and G.16 rootstocks.

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Table 1. Bloom, fruit yield, and growth characteristics of Golden Delicious apple trees on 23 rootstocks in the Iowa planting of the 2003 NC-140 dwarf apple rootstock trial for 2006.

Rootstock	Bloom rating ^z	Yield per/tree (lb)	Yield eff. ^y	Fruit wt (oz)	Trunk dia. (in.)	Tree ht (ft)	Tree spread (ft)	No. of suckers /tree	Tree vigor rating ^x
PiAu 51-4	0.6	3.4	.05	5.1	2.47	11.1	7.1	0.0	1.0
JM.2	1.8	18.1	.28	5.8	2.46	11.0	7.8	0.4	1.0
PiAu 36-2	0.3	1.3	.02	5.6	2.43	11.2	8.7	0.0	1.0
JM.5	0.0	0.0	.00	--	2.41	11.0	6.8	0.0	1.0
PiAu 56-83	0.1	0.1	.002	5.3	2.39	11.3	7.5	0.0	1.0
JM.8	1.9	17.9	.40	5.9	2.08	10.0	7.1	0.1	1.0
JM.7	1.8	13.0	.32	5.5	2.05	9.5	7.0	0.3	1.0
CG.6210	2.1	19.8	.43	5.9	2.04	10.6	7.3	0.4	1.0
PiAu 51-11	1.6	10.3	.23	5.9	2.03	9.3	6.4	2.0	1.3
J-TE-H	2.5	23.7	.55	5.9	1.96	9.7	7.5	0.0	1.2
JM.4	0.9	2.4	.07	4.8	1.94	9.1	5.7	0.0	1.3
CG.5935	4.0	30.2	.72	5.7	1.93	9.8	7.5	0.8	1.0
M.26	1.5	13.0	.37	5.4	1.79	9.6	6.7	0.0	1.3
B.62-396	3.1	21.4	.60	5.4	1.79	9.1	6.5	0.3	1.0
G.16	4.5	21.2	.64	4.6	1.72	8.6	6.1	0.3	1.9
M.9 Pajam2	3.1	18.8	.57	5.7	1.71	8.5	6.2	1.9	1.1
CG.5179	3.7	25.9	.79	5.6	1.70	9.2	6.7	0.4	1.3
JM.1	4.5	20.3	.65	5.1	1.67	8.5	6.6	0.3	1.4
JM.10	.8	2.5	.07	5.2	1.64	8.6	4.9	0.8	1.0
M.9 T337	3.8	21.1	.70	5.5	1.63	8.7	6.0	1.5	1.0
CG.3041	3.9	18.9	.72	5.5	1.51	8.7	5.7	0.0	1.1
B.9	4.3	13.3	.76	5.2	1.23	7.7	5.5	0.8	2.3
J-TE-G	4.3	12.5	.82	5.3	1.17	7.2	4.6	0.0	1.6
LSD (P<.05)	1.0	6.6	.14	0.6	.22	0.9	0.8	1.3	0.5

^zBloom rating: 0=failed to bloom; 1=very light; 2=light, 3=normal, 4=heavy, 5=very heavy.

^yYield efficiency is reported in kilograms of fruit per cm² of the trunk cross-sectional area. Higher values indicate more productive trees.

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