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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 2010 growing season.

Keywords
RFR A1040, Horticulture

Disciplines
Agricultural Science | Agriculture | Fruit Science | Horticulture

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Performance of an Established Dwarf Apple Rootstock Trial (2003 NC-140)

RFR-A1040

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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 2010 growing season.

Materials and Methods

The trees were planted at a 8 ft 2 in. × 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

Above normal snowfall occurred during the winter and the weight of accumulated snow caused breakage of primary scaffolds on several trees in areas of the plot. Two trees on G.16 and one tree each on CG.3041, CG.5935, J-TE-G, JM1, JM.2, JM.8, and M.9 Pajam 2 lost three or more scaffolds. For the remainder of the trial, these trees will no longer be considered data trees. High winds in July, estimated at 70 mph, broke off one tree on CG.6210 due to failure of the wire attaching the support conduit to the top wire.

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 PiAu 51-4, PiAu 56-83, JM.5, and JM.4 failed to come back with a normal bloom and remained the least productive. Based on trunk cross sectional area, trees remain separated into four size groupings: PiAu 51-4, PiAu 56-83, JM.5, PiAu 36-2, and JM.2 are the largest and in a semi-vigorous size range; JM.4, CG.6210, JM.10, PiAu 51-11, JM.8, CG.5935, J-TE-H, M.26, and Bud.62-396 in the M.26-size range; JM.7, CG.5179, 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 trees on M.9 T337, B.9, CG.6210, PiAu 51-4, and M.9 Pajam 2 averaging over three suckers per tree.

Generally fruit yields per tree were lower than normal due to a combination of very poor conditions during bloom, a late spring frost, high winds in July, and aggressive thinning. Fruit size was well above average with trees on all rootstocks except G.16, JM.1, and CG.5179 producing fruit in the 113 count

(6 oz) or high 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 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 and B.9 continue to be the most productive.

Trees in the planting were exposed to -25°F on January 15, 2009. During 2010, trees on G.16 continued to exhibit moderate symptoms of decline and produced smaller fruit even though the trees only carried moderate crop loads.

Acknowledgements

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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 2010.

		Trunk	Tree	Tree	No. of	Tree	Fruit	Avg.		Cumulative	
	Bloom	dia.	height	spread	suckers	vigor	yield	fruit wt	Yield	Yield	Yield
Rootstock	rating[z]	(in.)	(ft)	(ft)	/tree	rating[y]	(lb/tree)	(oz)	eff.[x]	(lb/tree)	eff.[x]
PiAu 51-4	1.5	5.2	16.7	10.3	4.4	1.0	14.9	6.4	.04	181.6	.59
PiAu 56-83	2.0	5.1	16.7	11.1	0.1	1.0	7.0	6.2	.03	121.2	.44
JM.5	2.0	5.0	16.2	10.2	0.0	1.0	14.3	6.3	.05	98.8	.34
PiAu 36-2	1.3	4.9	16.6	10.2	0.7	1.0	17.0	6.0	.07	194.9	.72
JM.2	2.7	4.8	15.9	10.3	1.3	1.0	21.1	6.3	.08	252.3	.98
JM.4	1.8	4.2	15.4	9.0	1.6	1.3	7.3	6.0	.03	99.7	.49
CG.6210	3.8	3.8	13.7	9.5	4.2	1.0	45.6	6.3	.27	306.5	1.89
JM.10	2.8	3.8	13.5	8.0	0.0	1.5	20.5	6.3	.13	123.5	.76
PiAu 51-11	3.7	3.7	11.9	8.0	1.7	1.9	21.8	6.5	.14	183.3	1.24
JM.8	3.6	3.7	13.7	9.1	1.4	1.4	31.9	6.0	.20	271.9	1.71
CG.5935	3.7	3.6	12.5	9.0	0.4	1.0	35.3	6.0	.25	281.3	1.95
J-TE-H	4.3	3.6	12.5	8.8	0.1	1.1	29.5	6.8	.20	218.0	1.53
M.26	4.1	3.5	13.2	9.3	0.4	1.1	28.5	6.3	.23	211.9	1.60
B.62-396	4.3	3.5	13.1	8.5	0.0	1.0	22.9	6.5	.17	202.1	1.48
JM.7	5.0	3.4	12.2	8.2	0.0	1.0	43.2	6.5	.35	275.3	2.17
CG.5179	3.6	3.3	12.2	8.4	1.7	1.3	22.3	5.9	.21	212.9	1.72
M.9 Pajam2	4.0	3.3	11.8	8.2	3.3	1.0	21.0	6.5	.18	208.3	1.69
M.9 T337	4.1	3.3	11.8	8.3	5.1	1.0	25.0	6.7	.20	202.9	1.66
G.16	4.8	3.0	10.0	7.3	0.3	2.3	33.7	5.8	.32	203.5	2.04
CG.3041	4.0	2.9	11.3	7.6	0.0	1.3	39.7	5.9	.42	222.9	2.34
JM.1	4.9	2.8	9.9	7.3	0.0	1.8	26.5	5.9	.32	153.0	1.71
J-TE-G	4.8	2.2	9.1	6.7	0.0	1.7	21.3	6.0	.38	138.0	2.52
B.9	5.0	2.1	9.0	6.4	5.0	1.6	18.7	6.1	.37	125.1	2.41
LSD (P < .05)	0.8	0.5	1.5	1.0	3.0	0.8	15.2	0.6	.15	37.4	.38

[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, grow weak; 5 = leaves off-color, small and sparse; growth very weak; 6 = dead.

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