

Performance of Gibson Golden Delicious on Dwarfing Rootstocks

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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 (Bud), 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 2011 growing season.

Materials and Methods

The trees were planted at a 8.2 × 16 ft spacing as two-tree plots in a randomized 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/Bud 9 trees were planted between each block and at the ends of the rows as pollinators. Trees were being trained to a vertical axis using a 3/4-inch metal conduit for support. Supplemental water was being provided though trickle irrigation.

Results and Discussion

Low temperatures and high winds during bloom severely limited honeybee activity and reduced yields (Table 1). Based on yield efficiency, smaller trees on J-TE-G, Bud 9, CG.3041, and G.16 appeared to have been less affected by poor pollination. Generally the smaller-sized trees with higher yield efficiencies such as Bud 9, J-TE-G, JM.1, and G.16 produced the smallest fruit. However, trees on CG.3041 had one of the higher yield efficiencies and produced relatively large-sized fruit, and large trees such as JM.5, PiAu 36-2, JM.4, and JM.10, had low yield efficiencies and produced smaller-sized fruit.

Based on trunk cross sectional area, trees continue to be separated into four size groupings: PiAu 56-83, PiAu 51-4, JM.5, PiAu 36-2, and JM.2 largest; JM.4, JM.10, CG.6210, JM.8, M.26, PiAu 51-11, CG.5935, J-TE-H, and Bud.62-396 in the M.26-size range; CG.5179, M.0 T337, JM.7, M.9 Pajam2, G.16, CG.3041, and JM.1 in the M.9-size range; and J-TE-G and Bud 9 in the smallest size range (Table 1). On a cumulative basis in each size range, trees on the following rootstocks continue to be the most productive: largest-size, JM.2; M.26-size range, CG.5935 and CG.6210; M.9-size range, CG.3041 followed by JM.7 and G.16; and for the smallest size range J-TE-G and Bud 9 were similar.

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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.

Rootstock	Bloom rating ^x	Trunk dia. (in.)	Tree height (ft)	Tree spread (ft)	No. of suckers /tree	Tree vigor rating ^y	Fruit yield (lb/tree)	Avg. fruit wt. (oz)	Yield eff. ^x	Cumulative	
										Yield (lb/tree)	Yield eff. ^z
PiAu 51-4	3.8	5.7	17.4	11.6	4.3	1.0	27.9	6.5	.08	209.6	.57
PiAu 56-83	2.8	5.7	17.8	12.6	1.3	1.0	14.6	6.9	.05	135.7	.41
JM.5	3.0	5.6	17.2	11.7	.0	1.0	19.2	5.8	.05	117.9	.34
PiAu 36-2	3.7	5.4	17.7	12.0	.0	1.0	34.9	6.0	.11	229.9	.71
JM.2	4.3	5.3	17.0	11.3	1.6	1.0	36.8	6.8	.12	286.3	.93
JM.4	3.9	4.7	16.5	10.2	.1	1.0	18.5	6.1	.08	118.2	.47
CG.6210	4.8	4.2	14.0	10.0	6.3	1.0	62.0	6.6	.33	368.5	1.92
JM.10	4.5	4.3	14.7	9.5	.3	1.0	39.1	6.1	.20	162.5	.80
PiAu 51-11	5.0	3.9	12.5	8.7	1.4	1.0	48.7	6.3	.29	232.0	1.39
JM.8	4.8	4.1	14.4	10.2	3.2	1.0	43.0	6.2	.23	314.9	1.67
CG.5935	4.7	3.9	13.4	9.7	1.4	1.0	50.1	6.8	.30	331.9	1.98
J-TE-H	4.5	3.9	13.5	9.6	.8	1.0	57.7	6.9	.35	275.7	1.66
M.26	4.4	4.1	14.2	10.0	.3	1.0	50.0	6.9	.30	261.9	1.50
Bud 62-396	4.5	3.9	14.5	9.4	.0	1.0	40.5	7.2	.24	242.6	1.46
JM.7	5.0	3.7	13.5	9.3	.0	1.0	64.1	6.4	.45	339.4	2.32
CG.5179	4.3	3.7	13.8	9.3	2.6	1.1	50.1	6.5	.40	263.1	1.86
M.9 Pajam2	5.0	3.6	13.1	9.5	4.9	1.0	50.1	6.6	.36	258.4	1.78
M.9 T337	5.0	3.7	13.1	9.1	5.6	1.0	54.9	6.7	.37	257.8	1.74
G.16	5.0	3.2	11.2	8.3	.3	1.0	60.7	6.0	.54	264.2	2.30
CG.3041	5.0	3.2	12.6	8.6	.1	1.0	67.7	6.4	.61	293.9	2.58
JM.1	4.8	3.0	10.2	8.1	.0	1.4	46.3	5.6	.47	199.3	2.01
J-TE-G	5.0	2.3	9.8	7.6	.0	1.3	57.9	5.5	1.00	195.9	3.33
Bud 9	5.0	2.2	9.6	7.0	7.1	1.8	44.7	5.3	.77	169.9	2.99
LSD (P<.05)	.6	.5	1.5	1.1	3.7	.3	15.7	.8	.17	37.6	.40

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

^yTree 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.

^zYield efficiency is reported in kilograms of fruit per cm² of the trunk cross-sectional area.

Higher values indicate more productive trees.