Sixth Year Performance of Honeycrisp Grafted on 31 Dwarfing Rootstocks of the NC-140 Regional Apple Rootstock Trial

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Introduction

Dwarfing rootstocks have the potential to increase profitability of tree-fruit growers by providing smaller trees suitable for high density plantings. Although the initial installation cost can be 10 to 30 times more than lower-density plantings, the long-range returns can far exceed the traditional plantings. However, to be viable as a commercial rootstock, dwarfing rootstocks must be adapted to a range of agro-climatic conditions, moderately disease resistant, high yielding, and produce quality fruit. To evaluate the adaptability and performance of new and promising apple rootstocks in the dwarfing size-control category, an NC-140 regional rootstock trial was established in 2010 at 11 sites in the United States (CO, IA, IL, MA, MI, MN, NJ, NY, OH, UT, WI), two sites in Canada (BC, NS), and one site in Mexico (CH) with Honeycrisp apples serving as the test cultivar. Iowa's project has 30 dwarfing rootstocks under evaluation with selections from Cornell-Geneva breeding program (G., CG.), Russia (B.), and Germany (PiAu, Supp.), with M.26 EMLA, M.9 Pajam2, and M.9 T337 serving as standards. Tissue cultured propagated (TC) rootstocks of G.41, G.202, and G.935 were included for comparison with normal (N) stool bed propagated rootstocks. This report summarizes the 2015 growing season.

Materials and Methods

The trees were planted at a 4 × 14 ft spacing with 1 to 3 trees/plot in a randomized block design replicated four times. Gala/B. 9 trees were planted between each block and at the ends of the rows as pollinators, and Auvil Early Fuji/Bud 9 trees were inserted as replacements for trees broken off by wind in 2010. Trees were trained to the tall spindle system using a 3/4-in. metal conduit for support. Supplemental water was provided through trickle irrigation.

Results and Discussion

Trees grafted onto CG.3001 and G.11 yielded the most in terms of numbers (128 and 132) and yield/tree (54.7 and 42.8). CG.3001 and G.11 produced zero suckers during the 2015 season and zonal chlorosis was moderate on CG.3001 (45%) and low on G.11 (14%). Generally, the Bud rootstocks had lower yields but larger fruit compared with other rootstocks. For instance, B.64-194 and B.67-5-32 yielded 27.4 and 15.3 fruit/tree averaging 0.51 and 0.49 lb. B.70-6-8, B.71-7-22, CG.4003, G.202TC, G.41N, G.41TC, and Supporter.3 all had zero suckers/tree. The lowest average zonal chlorosis percentages were observed on CG.4003 (6.7%), G.11 (14%), B.7-3-150 (15.5%), and B.70-6-8 (17.1%). G.11 had the highest yield efficiency at 36.0 lb/square in., followed by G.935 TC (34.4), G.5087 (27.5), and B.71-7-22 (27.4). Overall yields were up compared with 2014. Rootstocks worth watching are G.11, CG.3001, and G.935 TC.

Acknowledgements

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Table 1. Growth characteristics of Honeycrisp apple trees on 30 rootstocks in the Iowa planting of the 2010 NC-140 apple rootstock trial for 2015.

		2014		2015							
Rootstock	**Trees (no.)**	**2014 trunk CSA (in.^{2})[z]**	**2014 yield efficiency (lb·in.$^{-2}$)[x]**	**Yield (no.)**	**Yield (lb)**	**Suckers (no.)**	**Zonal chlorosis (%)**	**Average fruit weight (lb)**	**Trunk CSA (in.^{2})[z]**	**Yield efficiency (lb·in.$^{-2}$)[x]**	**Cumulative yield efficiency (lb·in.$^{-2}$)[y]**
B.10	9	3.2	4.6	75.7	27.4	0.2	20.0	0.39	1.0	26.3	39.7
B.64-194	7	3.4	1.8	27.4	14.0	1.1	43.6	0.51	2.7	5.3	10.2
B.67-5-32	10	3.1	2.9	15.3	7.7	0.3	28.0	0.49	2.9	2.7	8.0
B.70-20-20	12	0.5	10.3	7.9	4.1	6.9	34.8	0.52	3.8	1.0	5.0
B.70-6-8	11	2.9	3.4	47.0	23.1	0.0	17.1	0.50	2.9	8.7	11.1
B.71-7-22	4	3.2	3.4	39.5	9.5	0.0	51.3	0.27	0.3	27.4	43.9
B.7-20-21	12	0.9	3.2	74.8	33.4	0.5	19.2	0.45	2.5	14.1	13.2
B.7-3-150	10	1.2	4.3	51.1	25.3	0.4	15.5	0.49	3.1	8.7	9.8
B.9	8	2.7	6.1	65.8	21.5	0.9	20.0	0.33	0.7	33.2	32.0
CG.2034	4	1.2	6.8	54.8	22.3	0.6	43.0	0.41	0.9	25.9	31.5
CG.3001	2	2.1	12.3	128.0	54.7	0.0	45.0	0.43	2.2	25.3	32.9
CG.4003	3	2.5	3.6	82.7	24.3	0.0	6.7	0.30	0.9	26.5	35.3
CG.4004	4	1.7	12.5	101.0	40.2	1.0	20.0	0.41	1.7	24.4	39.0
CG.4013	3	2.8	7.0	48.0	22.7	25.0	28.3	0.46	2.7	9.7	11.7
CG.4214	8	1.9	3.5	57.3	21.8	7.4	52.5	0.38	1.4	16.0	30.1
CG.4814	4	1.7	3.5	73.0	32.5	2.5	51.3	0.46	2.3	15.0	22.7
CG.5087	3	3.0	6.8	117.7	42.1	0.7	50.0	0.36	1.5	27.5	32.1
G.11	8	1.7	6.8	132.0	42.8	0.0	14.0	0.34	1.2	36.0	40.1
G.202N	3	1.5	11.2	52.3	24.3	3.0	51.7	0.38	1.9	13.0	20.7
G.202TC	4	1.6	10.9	71.8	34.3	0.0	33.8	0.48	1.4	24.4	32.4
G.41N	8	1.7	2.6	93.5	31.3	0.0	21.9	0.37	1.2	28.0	40.6
G.41TC	2	1.2	1.6	58.0	24.4	0.0	20.0	0.41	1.4	18.0	31.5
G.935N	9	2.0	4.9	69.3	29.6	14.6	53.5	0.43	1.4	22.0	24.3
G.935TC	3	1.9	3.5	78.7	34.0	10.0	28.3	0.45	1.0	34.4	36.2
M.26EMLA	4	1.5	3.6	79.3	34.3	0.5	25.0	0.46	1.6	21.3	27.9
M.9Pajam2	10	2.8	6.5	49.2	18.6	6.4	45.8	0.39	1.3	14.5	19.1
M.9T337	11	1.9	1.3	80.4	33.2	1.5	28.3	0.42	1.3	25.9	29.5
PiAu51-11	11	1.6	7.2	67.8	32.9	1.5	27.7	0.50	2.4	15.4	21.4
PiAu9-90	3	0.0	0.0	28.2	8.8	1.7	87.5	0.32	1.5	6.5	7.3
Supp.3	2	1.9	10.0	16.0	5.4	0.0	65.0	0.33	0.5	4.4	35.7
HSD	-	1.4	8.0	81.0	12.6	14.5	47.6	0.09	1.4	23.2	

[z]Trunk CSA: trunk cross-sectional area $\{[(\text{trunk circumference} \div \pi) \div 2]^2 \times \pi\}$.

[y]Cumulative efficiency: (2014 yield lb + 2015 yield lb)/CSA2014.

[x]Yield efficiency: (yield ÷ trunk CSA).