2002 Massachusetts/New Jersey 'Cameo' Dwarf Rootstock Trial

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Planting Description and Protocol

In 2002, NC-140 plantings were established at the University of Massachusetts Cold Spring Orchard Research & Education Center in Belchertown, MA and at the Rutgers Snyder Research and Extension Farm in Pittstown, NJ. Cameo apple trees (Willow Drive Nursery) on three dwarfing rootstocks (G.16, M.9 NAKBT337, and B.9) were planted in a randomized complete block design (10 replications) spaced at 1.2 X 3.6 m. (Massachusetts) and 2.5 X 4.5 m (New Jersey). All trees were trickle irrigated and were trained to a vertical axis.

Annual measurements of trunk circumference, tree height and spread (2006 and 2011 only, reported here for 2011), root suckering, fruit yield (beginning in 2003), and fruit size (NJ only in 2004, 05, 08) have been made.

Table 1. Typical Cameo trees after harvest (October 11, 2011) on M.9 NAKBT337, G.16, and B.9 rootstocks, UMass Cold Spring Orchard, Belchertown, MA.

M.9 NAKBT337	G.16	B.9

Table 2. Overall trunk size, tree height and spread, suckers, and percent of the rootstock shank covered with burr-knots in 2011 of Cameo apple trees on three rootstocks in the 2002 MA/NJ NC-140 Cameo Dwarf Rootstock trial.

Rootstock	Trunk cross-sectional area (cm^2)	Tree height (m)	Tree spread (m)	Root suckers (no.)	Burr-knots (%)
G.16	66.2 a	4.2 a	2.5 a	1.3 b	3 a
M.9	50.6 b	3.8 b	2.4 a	2.8 a	1 ab
B.9	29.9 c	3.3 c	2.1 b	1.5 b	0 b

Levels not followed by a common letter are significantly different (Tukey HSD, $P = 0.05$).

Results

This report presents data from the 2011 (10th and final leaf) growing season, and results are presented in Tables 1-5.

Regarding tree growth (Table 2), G.16 had the largest trunk cross-sectional area followed by M.9 and B.9. In Massachusetts, G.16 was larger than both M.9 and B.9 (Table 2). In New Jersey, G.16 and M.9 were both larger than B.9. Trees were much larger in trunk area in New Jersey than Massachusetts, except for B.9. Those on G.16 were the tallest trees (tree height), followed by M.9 and B.9. B.9 had a lesser tree spread than G.16 and M.9. G.16 had more burr-knots than B.9 (Table 2) but did not differ from M.9 (which did not differ from B.9). None of the rootstocks had a large percentage of the above-ground shank covered with burr-knots.

M.9 had more root suckers than G.16 and B.9, which did not differ (Table 2). In Massachusetts, again M.9 had more suckers than the other two rootstocks; however, in New Jersey the rootstocks did not differ in suckering (Table 3). Overall, Massachusetts had more root suckers than New Jersey.

In 2011, there was no difference in yield per tree between the rootstocks across both states (Table 4). Yield per tree was much higher in New Jersey (36.3 kg) than in Massachusetts (15.3 kg). Cameo is highly biennial – in 2010, it was just the opposite, i.e. yield per tree in Massachusetts far exceeded New Jersey. Cumulative yield (2003-11) was higher for M.9 compared to B.9, however, M.9 did not differ from G.16 (Table 4).

Overall yield efficiency in 2011 was lowest for G.16 compared to M.9 and B.9, which did not differ (Table 4). This was also true in Massachusetts, however, in New Jersey B.9 had the highest yield efficiency compared to M.9 and G.16 which did not differ from each other (Table 5). B.9 had the highest cumulative yield efficiency (2003-2011) followed by M.9 and G.16 (Table 4). In Massachusetts, however, M.9 and B.9 did not differ but had higher yield efficiency than G.16. In New Jersey, B.9 had the highest cumulative yield efficiency compared to M.9 and G.16, which did not differ (Table 5).

Across both states, fruit size (fruit weight) did not

Table 3. Trunk size and number of root suckers by state in 2011 of Cameo apple trees on three rootstocks in the 2002 MA/NJ NC-140 Cameo Dwarf Rootstock trial.

	Trunk cross-sectional area (cm^2)		Root suckers (no.)	
Rootstock	Mass.	New Jersey	Mass.	New Jersey
G. 16	48.5 a	84.0 a	2.1 b	0.4
M.9	26.1 b	75.1 a	5.6 a	0.1
B.9	21.5 b	38.4 b	2.7 b	0.2

Levels not followed by a common letter are significantly different (Tukey HSD, $P = 0.05$).

Table 4. Overall fruit yield, cumulative yield, yield efficiency, cumulative yield efficiency, and fruit weight in 2011 of Cameo apple trees on three rootstocks in the 2002 MA/NJ NC-140 Cameo Dwarf Rootstock trial.

Rootstock	Yield per tree (2011, kg)	Cumulative yield per tree (2003-11, kg)	Yield efficiency (2011, kg/cm^2 TCA)	Cum. yield efficiency (2003-11, kg/cm^2 TCA)	Fruit weight (g)
G.16	26.2	181.5 ab	0.37 b	3.84 c	223
M.9	27.4	194.4 a	0.66 a	5.03 b	220
B.9	23.8	156.3 b	0.77 a	6.78 a	209

Levels not followed by a common letter are significantly different (Tukey HSD, $P = 0.05$).

Table 5. Yield efficiency and fruit size by state in 2011 of Cameo apple trees on three rootstocks in the 2002 MA/NJ NC-140 Cameo Dwarf Rootstock trial.

	Yield per tree (2011, kg)		Cumulative yield per tree (kg, 2003-11)		Yield efficiency (kg/cm^2 TCA)		Cumulative yield efficiency (kg/cm^2 TCA, 2003-11)		Fruit weight (g)	
Rootstock	Mass.	New Jersey	Mass.	New Jersey	Mass.	New Jersey	Mass.	New Jersey	Mass.	New Jersey
G. 16	11.4	41.0	167	196	0.24 b	0.49 b	3.76 b	3.92 b	230 a	215 b
M.9	21.2	33.6	196	193	0.88 a	0.44 b	5.63 a	4.44 b	193 b	248 a
B.9	13.4	34.3	148	164	0.63 a	0.91 a	6.84 a	6.72a	199 b	221 b

Levels not followed by a common letter are significantly different (Tukey HSD, $P = 0.05$).

differ between the rootstocks (Table 4), however, fruit in New Jersey were significantly larger (228 g) than those in Massachusetts (207 g). Within Massachusetts, Cameo fruit from G.16 trees were larger than those from M.9 and B.9, but in New Jersey, fruit were larger from M.9 (Table 5).

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