World's Best Commercial Dessert Apples

ROBERT A. NORTON

Just for fun I recently wrote to a group of 19 apple variety experts from throughout the world. The 20 cultivars that got the most votes are shown below along with the number of votes they received: 'Jonagold' 19, 'Gala' 18, 'Golden Delicious' 16, 'Cox's Orange Pippin' 12, 'Fuji' 11, 'Elster' 10, 'Empire' 10, 'Delicious' 10, 'Braeburn' 8, 'Granny Smith' 8, 'Mutsu' 6, 'Jonathan' 5, 'McIntosh' 4, 'Senshu' 4, 'Macoun' 3, 'Melrose' 3, 'Spartan' 3, 'Tsugaru' 3, 'Boskoop' 2, 'Criterion' 2.

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Early Performance of MAC Apple Rootstocks in Ohio[1]

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Abstract

In 1977 trees of 'Empire' and 'Golden Delicious' were established on selected rootstocks of the Michigan Apple Clone series at a site in southern Ohio. Significant tree loss occurred with trees on M.26. The rootstocks MAC 4, MAC 16 and MAC 24 produced standard sized trees with relatively poor precocity and productive efficiency. MAC 1 produced trees similar in size to M.26 and M.7, but lacked precocity and productivity compared to M.26. Trees on MAC 9 (MARK) were not as productive or efficient as trees on M.9 and M.26 and were similar in size to these rootstocks.

Introduction

The commercially available apple rootstocks demonstrate some deficiency; they are either too large for some intensive orchard management systems or lack of survival due to susceptibility to fireblight, collar rot or winter injury on some sites (4, 5). The recent introduction of the Michigan Apple Clone series (1, 2) provided new material to test for adaptability to various fruit growing areas. One of this series, MAC 9, has been named and introduced as MARK (2) and early reports of the results through the NC-140 cooperative test were promising (7).

The trial reported here compares the performance of 'Empire' and 'Golden Delicious' on selected Michigan Apple Clone (MAC) rootstocks over 10 years at a site in southern Ohio.

Materials and Methods

In May, 1977, variable numbers of trees on the different rootstocks donated by Dr. Robert F. Carlson and Michigan State University were planted 10 x 20 feet in a single row of each cultivar, with rootstocks randomized down the row. Initially none of the trees were staked, but very early cropping on MAC 9 and M.9 required that these trees receive some training support by a wooden post. The trees were minimally pruned and in the early years trained to central leaders using limb spreaders. Yield, suckers/tree and trunk circumference were recorded annually and following harvest in 1987, tree height and spread were measured.

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Results and Discussion

Beginning in the fourth year, significant tree loss occurred with both cultivars on M.26. Previously similar losses of this stock have been recorded on this site (3, 6) due to fireblight infection and intolerance of the soil drainage. Both factors likely played a role in the tree loss experienced in this study, although only a few random strikes of fireblight were observed in this planting.

The rootstocks MAC 4, MAC 16 and MAC 24 produced standard size trees in this trial being more than 6 m tall (Table 1). Trees on MAC 1 were between M.26 and M.7 in size and not significantly different in size than trees on M.26. Trees on MAC 9 (MARK) were between M.9 and M.26 in size and not significantly different than either rootstock. Trees on M.4, M.7A and MAC 24 produced an excessive amount of root suckers compared to the other rootstocks.

Trees on M.9, M.26 and MAC 9 were very precocious, cropping significantly in the third year with a few fruit produced on these rootstocks in their second growing season (Table 2). Trees on MAC 16 were tardy in beginning to crop and along with MAC 24 and MAC 4 had low cropping efficiency throughout the trial. A severe frost during bloom in 1986 eliminated the crop of 'Empire' and severely reduced the crop of 'Golden Delicious.' It is interesting to note that the small trees on M.9 and M.26 produced nearly as much as the larger trees on MAC 16 and MAC 24, but none produced as much as the large trees on MAC 4 under frost conditions.

Table 1. Tree size and suckering of 'Empire' and 'Golden Delicious' on selected rootstocks from the Michigan Apple Clone series at 10 years of age (Jackson, Ohio).

Rootstock	Number of trees	Loss %	Trunk X-sect. area $(cm)^2$	Tree Height (m)	Tree Spread (m)	Suckers/ tree
			'Empire'			
MAC 4	5	0	295.7ab*	6.4a	4.8ab	40.0cd
MAC 9	6	17	52.8f	2.9ef	3.5c	6.1d
MAC 16	6	0	311.4a	6.6a	4.7abc	18.0d
M.4	6	17	231.9c	5.3b	5.1a	195.0a
M.7A	6	17	181.1d	4.5bcd	4.5abc	102.0b
M.9	6	0	49.5f	2.4f	3.5c	4.8d
M.26	6	66	117.9def	3.9cde	4.5abc	0 d
			'Golden Delicious'			
MAC 1	6	0	154.1d	4.8bc	3.9c	2.5d
MAC 4	6	17	296.2ab	7.2a	5.2a	7.6d
MAC 9	4	50	54.2f	2.8ef	3.5c	.5d
MAC 16	5	20	259.7abc	7.1a	4.9ab	19.5cd
MAC 24	6	0	253.9bc	6.4a	5.1a	58.3c
M.9	6	17	95.3ef	3.8de	4.1bc	1.2d
M.26	6	66	144.9de	4.6bcd	4.7abc	1.0d

*Mean separation by Duncan's Multiple Range Test, 5% level.

Table 2. Yield performance of 'Empire' and 'Golden Delicious' on selected rootstocks from the Michigan Apple Clone series over 10 years at the Jackson Branch.

Rootstock	Yield lbs/tree								Productive Efficiency lbs/cm²		Cumulative Yield	
	80	81	82	83	84	85	86	87	80-84	85-87	lbs/tree	lbs/cm²
						'Empire'						
MAC 4	8.6bc	36.0b	25.1fg	113.2cd	264.8ab	84.2def	0	411.5abc	2.40f	1.70g	943.7bcd	3.2f
MAC 9	4.9bcd	33.4b	6.6fg	19.3e	79.9de	57.7ef	0	64.2f	4.85d	2.50def	280.5g	5.6cd
MAC 16	.3d	8.1c	3.0g	36.4e	108.0cde	63.9ef	0	239.0d	.76g	.94h	458.9fg	1.4g
M.4	5.1bcd	46.1b	15.8fg	144.8cd	276.0a	167.7ab	0	452.5ab	3.25ef	2.66cde	1108.3bc	4.8de
M.7A	9.2b	38.6b	18.8fg	166.0c	256.5ab	101.4cdef	0	230.0de	4.28de	1.94efg	820.8de	4.7de
M.9	7.3bc	43.6b	21.2fg	36.7e	141.9cde	56.3ef	0	176.7de	6.83bc	4.67a	484.0fg	9.4a
M.26	17.7a	101.4a	26.7efg	189.8bc	231.1abc	154.0abc	0	278.6cd	7.73b	3.63bc	1014bcd	8.5ab
						'Golden Delicious'						
MAC 1	2.0cd	44.8b	87.2d	130.9cd	100.2cde	74.0def	0	206.0de	4.15de	1.87fg	645.3ef	4.3def
MAC 4	8.7bc	32.1bc	161.8b	334.1a	216.8abc	219.0a	97.7a	505.1a	3.95de	2.78cd	1575.7a	5.3cde
MAC 9	22.0a	48.0b	33.7ef	59.9de	10.0e	67.4def	8.0cde	89.7ef	5.31cd	3.15bcd	355.2fg	6.6bc
MAC 16	1.1cd	7.6c	51.7e	286.1ab	128.7cde	109.1cde	40.6b	446.8ab	2.92ef	2.26defg	1071.8bcd	4.0ef
MAC 24	5.3bcd	27.4bc	82.1d	276.7ab	93.8de	133.9bcd	18.8cd	396.8bc	2.97ef	2.13defg	1035.0bcd	4.0ef
M.9	21.5a	100.7a	108.1c	156.0c	168.6bcd	47.5f	25.5bc	201.9de	9.87a	2.87cd	830.0cde	8.7a
M.26	8.7b	116.6a	192.9a	287.3ab	32.3e	215.4a	40.1b	314.6bcd	6.49bc	4.01ab	1207.9b	8.5ab

*Mean separation by Duncan's Multiple Range Test, 5% level.

'Golden Delicious' trees on MAC 1, although in the desirable size class between M.26 and M.7, were not nearly as precocious or efficient (yield/trunk area) as trees on M.26 and they were severely affected by the frost. However, trees on MAC 1 had a smooth graft union and survived much better than M.26, which exhibited the swelling at the union typical with M.26. Although it is difficult to draw firm conclusions because of limited number of trees, MAC 4 and MAC 16 appeared to perform better with 'Golden Delicious' than with 'Empire' having a higher cumulative yield/tree and production efficiency. When the same comparison across cultivars is made with M.26, yield and efficiency of the two cultivars were similar. With 'Empire' cumulative yield efficiency of trees on MAC 9 was lower than on M.9 or M.26. The same trend was evident with 'Golden Delicious,' but the difference between M.26 was not significant.

The tree in this study received minimal pruning and no thinning in the early years in hopes of evaluating the productive potential of these rootstocks. Trees on MAC 9 were particularly adversely affected by this treatment and at 10 years of age had very sparse canopies with weak pendant branches, very little terminal growth and appeared as senescent trees. Trees on M.9 and M.26 exhibited a much better balance of growth and did not appear senescent.

In summary, trees on MAC 4, MAC 16 and MAC 24 were too large for intensive orchard systems and were slow to begin bearing and relatively inefficient. Although trees on MAC 1 were a desirable size, they lacked productivity and prococity. Trees on MAC 9 (MARK) were not as productive or efficient as trees on M.9 and M.26 and at 10 years of age trees on MAC 9 did not have a desirable balance of growth and appeared senescent.

Literature Cited

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Erratum

Index page 45 in Vol. 43(2) — The paper "Five New Low-Chill Peach Cultivars" by W. B. Sherman and R. E. Rouse was not included and will be in Vol. 43(3) page 120.

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New York Apple Taste Panel Results

Cultivar	Percent ranked		
	Poor	Okay	Good
Empire	0	17	83
74840-1	17	33	50
75413-30	17	17	67
Liberty	0	33	67
75413-96	0	50	50
Marshal Mc	17	33	50
Mutsu	17	50	17
75441-67	0	83	17
Florina	0	100	0
75414-1	50	33	17

Conducted by Bob Lamb.