Increased Productivity of Montmorency Tart Cherry on WA 900 Mahaleb Roots

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Abstract

Seedling rootstock of the WA 900 *Prunus mahaleb* L. clones increased the productivity of Montmorency cherry in excess of one metric ton/hectare over a 19 year period. Seedlings of the NY Mz clones of mazzard when used as rootstocks increased the yield of Montmorency over those with Gold seedling roots. Both sources are available in the IR-2 Repository.

The influence of rootstocks on the longevity and productivity of stone fruit cultivars has been appreciated by horticulturalists (1, 3, 4, 5, 6) for many years. Several sources of *Prunus mahaleb* L. (mahaleb) and *P. avium* L. (mazzard) have been identified as potentially useful rootstocks for the tart cherry cultivar, Montmorency. The incidence of prunus ringspot (PRSV) and prune dwarf (PDV) virus infections in these rootstocks is widespread (5) but healthy clones have been located. The long range performance of seedlings of these clones, however, has not been reported.

Procedure

Four seedling populations of mahaleb WA 900, Turk 4, Mich Mh and S 141 were used in the study. The WA 900 seedlings were grown from seed of clones selected and supplied by E. C. Blodgett, Prosser, Washington. Blodgett also supplied seedlings of Turk 4 (P.I. 181721), a clone which he had selected in Turkey. Mich. Mh seedlings were grown from seed of mahaleb clones selected by Donald Cation, East Lansing, Michigan, who supplied the seedlings. S 141 is a clone selected and supplied by H. W. Guengerich, Louisiana, Missouri, for its resistance to the leaf spot fungus *Coccomyces hiemalis* Higg. Two populations of sweet cherry, NY Mz and Gold, were used in the study. NY Mz represents a seedling progeny from Mazzard clones selected in Germany for their rootstock potential and supplied by K. D. Brase, Geneva, New York. Gold represents seedlings from the cultivar, Gold, and were supplied by Guengerich.

Virus-free *P. cerasus* L., cv. Montmorency, was budded on the six rootstocks in a nursery, then transplanted as one-year-old trees in the cherry orchard block in the New Franklin (MO) Horticulture Farm. Trees were placed in a randomized block design with 6 replications and single tree plots spaced 7.6 × 7.6 m. The soil is classified as a well drained Menro silt loam which is a deep, friable, brown loessial soil. The planting was clean cultivated in the first year, then seeded to a mixture of perennial grasses and mowed as needed thereafter. Periodic leaf analyses indicated a need for only nitrogen, thus ammonium nitrate was applied annually (1 kg/tree/year). Insects and pathogens were controlled according to the recommendations of the Missouri Agriculture Experiment Station. Uniform fruiting was maintained by pruning.

Results and Discussion

After 7 years the circumference of the trees on the different rootstocks averaged 14 cm and did not vary significantly from each other (Table 1). After 15 years (1978), the trees with the NY Mz roots were the largest but not significantly larger than those with Gold or Turk 4 roots. After 19 years the largest trees were those with NY

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Table 1. Influence of six rootstock sources on trunk circumference of Montmorency tart cherry.

Rootstock	No. of trees		Mean circumference of trunk[z] (cm)		
P. mahaleb	1964	1982	1970	1978	1982
WA 900	6	4	13.0	83.0 bc	88.7 c
Mich Mh	6	4	14.0	81.8 c	90.5 c
Turk 4	6	4	14.0	88.0 abc	98.8 b
S 141	7	5	14.0	79.8 c	83.8 c
P. avium					
NY Mz	5	4	15.0	97.5 a	108.5 a
Gold	4	3	15.0	90.7 ab	99.7 b
			NS		

[z]means followed by the same letter(s) within a vertical column are not significantly different at the 0.05 level according to the SAN multiple means test (7).
NS — Nonsignificant.

Table 2. Influence of six rootstock sources on yield of Montmorency tart cherry.

Rootstock	No. of trees	Mean yield of trees in five year periods[z] (kg. tree/yr.) 1968-72	1973-77	1978-82	Avg. yield, 1968-82 metric T/ha
P. mahaleb					
WA 900	4	27.6	53.7 ab	45.0	10.83 a
Mich Mh	4	27.6	57.3 a	38.5	9.72 b
Turk 4	5	24.7	47.9 cd	37.0	9.54 bc
S 141	4	29.0	43.4 d	36.3	9.24 c
P. avium					
NY Mz	4	23.2	50.8 bc	41.4	9.54 bc
Gold	3	20.3	38.5 e	36.3	7.92 d
		NS		NS	

[z]Means followed by the same letter(s) within a vertical column are not significantly different at the 0.05 level according to the SAN multiple means test (7).
NS — Nonsignificant.

Mz roots and the smallest were those with S 141 roots. Trees with WA 900 and Mich Mh roots were intermediate.

Fruit yields from the fifth through the nineteenth years ranged from 32.9 to 43.6 kg/tree, Lumping these annual yield records into three 5 year periods (Table 2) shows that there are no significant rootstock effects during the first five years. Significant ($P = 0.05$) rootstock effects were found in the second five years when productivity was maximum. The greatest average yield per tree was associated with trees having WA 900 and Mich Mh roots. By the fourteenth year (third five year period) production had peaked for all combinations and began to decline. There were no significant differences in yield during this period although the trees with WA 900 roots were the most productive. When the yields were averaged for the 15 bearing years and extrapolated to metric tons/hectare, however, the trees with WA 900 roots would have significantly out yielded the other combinations and those with Gold roots would have had the lowest yields.

The increased productivity of Montmorency with WA 900 roots results from a more sustained yield over the entire 15 year fruiting period. Fruit production of Montmorency on the other rootstocks peaked during the first 10 years and thereafter declined. Differences in yields amongst the Montmorency with different mahaleb roots and the greater productivity of Montmorency with mahaleb roots over those with mazzard roots were also noted by Westwood *et al.* (8).

The greater vigor of trees with *P. avium* roots found in this study supports the observations of Howe (5) but other studies (3, 8) found that mahaleb roots induced more vigor to the scion. Soil type and environment may be the reason that such conflicting observations led Clarke and Anthony (2) to conclude, and we concur, that the source of the seedling is as influential on the productivity of the scion as is the species of the rootstock. This reduced vigor associated with mahaleb roots has obvious advantages in orchard management costs.

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Influences of Rootstocks and Support Systems on Yield, Tree size and Cork Spot on Spur and Non-Spur Delicious Apple Trees

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Delicious is the leading apple cultivar being planted today. There have been many reports in the literature comparing yields of various strains on different rootstocks (1, 2, 3, 4, 8, 11); however, most of these studies report only total accumulated yields after several years. The early yields are often not presented or are combined in a 10-year total.

The current trend of higher density apple orchards on size controlling rootstocks has increased establishment costs considerably in the past two decades. Funt *et al.* (6) has shown that planting densities which produce an earlier return are more desirable than ones which have an equal or higher return later.

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