Performance of 3 Sweet Cherry, *Prunus avium* L. Cultivars on 5 Clonal Rootstocks[1]

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Abstract

Prunus avium cvs Napoleon, Bada and Corum were grafted on limbs of the following rootstock clones; F 12/1, MxM 2, MxM 60, MxM 97, and OCR 2. After 7 years, ignoring the effect of rootstock, Bada trees were half as large as Napoleon and Corum trees were slightly larger than Napoleon.

Trees on MxM 2 rootstock were not different in size from trees on F 12/1. Trees grafted on MxM 60 were 60% as large, and on MxM 97, 34% as large. Trees on OCR 2 were precocious but were removed due to infection with prune dwarf virus. All MxM trunks suckered more than F 12/1. Rootstock had little or no effect on fruit size, soluble solids, removal force or yield, except MxM 97 which were weak and low-yielding.

In Western Oregon, sweet cherries are commonly grown either on seedlings of *Prunus avium* or on the P. avium clone F 12/1. To avoid tree losses due to bacterial canker (1), cultivars are budded or grafted onto limbs of established seedling or F 12/1 understocks in the orchard. Both understocks produce vigorous trees which are slow to begin bearing (4). After 15-20 years the trees become so large that trunk shaking is difficult.

Advantages to the use of interspecific hybrids as rootstocks for sweet cherry have been proposed by Cummins (2) and others. Vladimir, a dwarfing rootstock clone of *Prunus cerasus* L. (4), was rejected in Oregon because it appears to dwarf excessively and produces too many root suckers. Growth control and canker resistance of sweet cherry cultivars on several clonal selections of suspected hybrids between P. avium and P. mahaleb ("MxM" stocks) including MxM 60 and OCR 2 was previously reported (4), (5).

Methods and Materials

Understock trees of the following 5 clones were obtained from nurseryman Lyle Brooks of Forest Grove, Oregon in 1975: F 12/1, MxM 2, MxM 60, MxM 97, OCR 2. These were planted in an experiment with split-plot randomized block design replicated 8 times. Main plots were cultivars, Napoleon, Bada and Corum, rootstocks were subplots. Thus there were 8 trees of each rootstock-scion combination. The experiment was located on the Lewis-Brown horticultural research farm, Corvallis, Oregon Guard. trees on MxM 39 or MxM 60 surrounded the experiment and alternated with rows of test trees within the block. Trees were spaced 3.66 by 5.49 m. Cultivars were budded or grafted in 1975, 76 and 77. Although most trees received 3 or 4 grafts on the limbs, a few slow-growing trees had only one graft. Trunk suckers were pruned off annually. The block was maintained without irrigation and with flail mowing between rows and herbicided in the rows. Depredation by pocket-gophers caused some missing trees and introduced variation to part of the block. All data from replicate 7 were discarded due to the growth reduction caused by competition from a group of large oak trees. Since application of the enzyme-linked immunosorbent assay (ELISA) test showed that all trees on OCR 2 rootstock were infected with prune dwarf virus, the tops were removed to reduce spread of the virus by pollen.

Bloom-density was rated on a scale with 1 = none, 2 = little, 3 = moder-

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ate, 4 = much, 5 = completely covered. Total yield was visually estimated in 1981, and determined by harvesting using a shaker and weighing in 1982. Fruit weight was calculated from a random sample of 100 fruits per tree. Soluble solids were measured with a hand refractometer, fruit removal force by pulling the stem from the cherry with a Hunter fruit removal force (F.R.F.) gauge, and the trunk diameter was measured about 25 cm above ground. Because of the loss of 3 trees of Bada /97, and dissimilarity of all trees on 97 with the rest of the population, trunk cross-section of trees on MxM 97 was not included in the overall statistical analysis, but, because of interest in dwarfing stocks, a separate comparison of the remaining trees with controls was made.

Results

The earliest major difference observed was the heavy blooming tendency of trees on OCR 2, (Table 1), which had been reported earlier (4). Napoleon trees tended to bloom less in the early years than did Bada or Corum, (Table 1). Trees on F 12/1 and MxM 2 bloomed less profusely than trees on OCR 2, MxM 97 or MxM 60. Excessive trunk suckering was a problem on all stock except F 12/1, (Table 5). It was a greater problem with MxM 2 and 60 than with OCR 2 or MxM 97. MxM 97 understocks are so weak that no one should attempt to graft on their limbs. Rootstock has no significant effects on fruit size in 1981, but in 1982, fruit on MxM 2 was larger than on F 12/1 or MxM 60 (Table 3). Rootstock did not significantly effect soluble solids content of fruit, or F.R.F., (Table 5). Cultivar F.R.F. was lowest for Bada, and high-

Table 1. Bloom ratings for three sweet cherry cultivars on five rootstocks at Corvallis, Oregon. 1 = none, 5 = very heavy.

	Mean Bloom Ratings Year		
	1979	1980	1981
Cultivar			
Napoleon	2.4	2.9	3.5
Bada	2.8	3.2	3.6
Corum	2.7	3.4	3.8
Rootstock			
F-12-1	2.0	2.2	2.8
OCR 2	3.4	4.8	5.0
MxM	2.0	2.5	3.0
MxM 60	2.8	3.3	3.7
MxM 97	3.1	3.7	5.0

Table 2. Yield, Kg of three sweet cherry cultivars on three rootstocks at Corvallis, Oregon.

	1981	1982
Cultivar		
Napoleon	6.99 a[x]	11.20 a
Bada	2.36 b	6.12 b
Corum	5.08 a	16.96 c
Rootstock		
F-12-1	3.36 a	11.75 a
MxM 2	4.72 a	11.70 a
MxM 60	6.35 a	10.84 a
MxM 97	7.6[y]	11.3

x — Mean separation at the 5% level.
y — Mean of trees which did produce.

Table 3. Weight/fruit in gms of three sweet cherry cultivars on three rootstocks at Corvallis, Oregon.

	1981	1982
Cultivar		
Napoleon	7.03 a[x]	6.87 a
Bada	8.89 b	6.40 b
Corum	8.02 c	6.90 a
Rootstock		
F-12-1	7.81 a	6.69 a
MxM 2	8.04 a	7.03 b
MxM 60	8.10 a	6.45 c

x — Mean separation at the 5% level.

Table 4. Fruit removal force, gms, of three sweet cherry cultivars on three rootstocks.

	1981	1982
Cultivar		
Napoleon	815 a	498 a
Bada	602 c	391 c
Corum	684 b	414 b
Rootstock		
F-12-1	734 a	417 a
MxM 2	619 b	468 a
MxM 60	748 a	418 a

Table 5. Mean number of suckers/ trunk in 1980 of five sweet cherry root and trunk stocks.

	Root and Trunk Stock				
	F-12-1	OCR 2	MxM 2	MxM 60	MxM 97
No. suckers	1.0	3.4	10.3	7.3	4.6

Table 6. Influence of Cultivar and rootstock on trunk cross-sectional area in cm² of sweet cherry, *Prunus avium* trees.*

	Rootstock			
Cultivar	F-12-1	MxM 2	MxM 60	Mean
Napoleon	185	178	103	155 b
Bada	81	76	64	74 a
Corum	191	188	135	171 c
Mean	152 a	147 a	100 b	

*Mean separation 5% level.

Table 7. Influence of cultivar and rootstock on trunk cross-sectional area in cm² of sweet cherry *Prunus avium* linn. trees, comparing only F-12-1 with MxM 97. (Excluding dead or sick trees.)

	Rootstock	
Cultivar	F-12-1	MxM 97
Napoleon	185	62 (7)*
Bada	81	17 (4)
Corum	191	61 (7)
Mean	152	52

*Number of trees.

est for Napoleon. Trees of Bada were about 50% as large as Napoleon, which in turn, were slightly smaller than Corum, (Table 6). Trees on MxM 60 were only 2/3 as large as trees on F 12/1 or MxM 2. Trees on MxM 97 were 33% as large as trees on F 12/1, (Table 7), but their size was extremely variable. Rootstock had no significant effect on yield, (Table 2), or yield-efficiency.

Discussion

Although none of the new clones tested were completely satisfactory as trunk stocks because of excessive suckering, some orchardists may feel that their beneficial characteristics outweigh this disadvantage. Napoleon trees should be budded on limbs of F 12/1 or seedling. Due to their acceptable field resistance to canker, Bada and Corum trees could be low-budded or perhaps own-rooted. If OCR 2 can be obtained without virus, it would have a place where extreme precocity is desired, but it should be grafted low to reduce suckering. MxM 97 might be a good dwarfing stock when grafted close to the ground. MxM 60 merits commercial testing as a semi-vigorous rootstock.

Literature Cited

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