mentosa nor *P. besseyi* can be recommended for all cultivars that may be in commercial plantings and we concur with Rogers and Stadelbacher (4). However Redhaven on *P. tomentosa* and *P. besseyi* have done extremely well in this limited study and with Rogers on *P. besseyi* and *P. tomentosa* for Fisher (2, 4). Harbrite did moderately well on both rootstocks in this study and had excellent yield. Candor did well on *P. tomentosa.* Yield was low which could be more cultural than cultivar/rootstock. Also between the second and third leaf there was no additional tree loss. All trees in the third leaf appeared to be sufficiently vigorous for an additional season. Therefore, further studies, which include virus free rootstock and scion and physiological studies of scion and rootstock compatibility, *should* be undertaken before these rootstocks are characterized as unsatisfactory for peaches.

Literature Cited

1. Emerson, F. H. 1976. The tree wall concept of apple and peach production. *Pa. Fruit News* Vol. 55(4):23-25.
2. Fisher, D. V. 1977. Palmette proves practical. *Am. Fruit Grower* 97(8):15-18.
3. Stembridge, G. E. and C. E. Gambrell, Jr. 1976. High density peaches go full tilt. *Am. Fruit Grower* 96(12):8-11.
4. Rogers, B. L. and G. J. Stadelbacher, 1978. Performance of peaches on dwarfing rootstocks in western Maryland. *MD Fruit Grower* 48(1) pp. 6-8.

Interstock/Rootstock Effect on Bing Cherry Fruit Quality[1]

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Abstract

Bing cherry fruit from trees on 4 sour cherry interstocks with 2 mazzard and 2 mahaleb rootstocks were evaluated 2 seasons for interstock/rootstock effects on fruit firmness, weight, soluble solids, size, color, and yield. Rootstock exerted a greater influence than interstock. Firmness, weight, soluble solids and fruit size tended to be greater with mazzard than mahaleb stocks while yields tended to be lower. Fruit size, firmness, and crop load were only partially interdependent since larger cherries from trees on mazzard stocks were also firmer than from mahaleb stocks.

There is ample evidence in the literature of a rootstock effect on fruit maturity and/or quality (1-13). While the foregoing references provide evidence that a rootstock effect might be expected, the list is not intended to be all inclusive.

A Bing sweet cherry planting at the Washington State University Royal Slope Research Unit provided an opportunity to investigate the possibility of an interstock/rootstock effect on cherry fruit quality. The planting was established in 1964 and included 240 (including border trees) Bing trees with 4 possible interstocks on 4 possible rootstock combinations. The interstocks (about 30 cm long) were the sour cherry cultivars Kansas Sweet (KS), Northstar (NS), Montmorency (MM), and Redrich (RR). Rootstocks were F/12/1 Mazzard, New York Mazzard (NYM), Mahaleb 4 (M4), and Mahaleb 900 (M900). F/12/1 is an East Malling clonally propagated stock. NYM is a common seedling stock. The mahaleb stocks are seed-

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ling stocks selected by Dr. Earle Blodgett at Prosser, WA.

Tree spacing was 3.8m x 7.6m in a split plot design with two replications of 5 trees each. Three trees in each plot were permanent trees and 2 were filler trees for removal if necessary. A permanent cover of S-143 orchard grass was grown for most of the orchard life with a grass-and weed-free herbicide strip under the trees. Overtree sprinkler irrigation was used after 1970.

Yields per tree were measured at commercial harvest. Fruit for quality evaluation was selected at the time of commercial fresh market maturity both seasons. Harvest maturity was based on acceptable color as determined by local commercial buyers. Samples were selected from each permanent tree by completely stripping the fruit from a branch in a comparable location on each tree. Ten cherry random sub-samples were selected for evaluation from each larger sample. The samples were put in zip-lok poly bags and transported to Pullman the same day in insulated cold chests. Fruit was held in 0°C storage until evaluation the day after harvest.

Individual fruit were evaluated for color, using a visual scale of 1 to 4 (1 = light red, 2 = red, 3 = dark red, 4 = mahogany), row size (smaller numbers indicate larger size), firmness (durometer), and soluble solids (hand refractometer). Each cherry sample was weighed.

Results and Discussion

Interstock had no significant effect on yield or fruit characteristics measured in 1976 (Table 1). In 1977, weight, soluble solids, size, and color, tended to be superior with Redrich interstock. Although not statistically significant, this interstock produced the lowest yield in 1977 suggesting some interaction of these measures with crop load. However, the firmest

Table 1. Interstock/rootstock effect on Bing cherry fruit quality and yield[1]

	Firmness[2]		Weight (gm 10 fruit)		S. Solids (%)		Size (row)[3]		Color[4]		Yield (Kg)[5]	
Interstock	1976	1977	1976	1977	1976	1977	1976	1977	1976	1977	1976	1977
Redrich	30.8	29.5	79.0	92.0a	16.3	18.3a	11.1	10.4b	2.7	2.9a	38.4	13.2
Northstar	30.8	28.5	79.5	87.4b	17.7	17.9ab	11.0	10.5ab	2.6	2.6b	33.4	17.8
Kansas Sweet	31.1	28.5	79.9	87.0b	17.4	17.5b	11.0	10.6a	2.6	2.7ab	33.8	16.8
Montmorency	30.8	27.3	82.6	85.8b	16.5	17.3b	10.8	10.7a	2.5	2.7ab	34.2	23.1
Rootstock												
New York Mazzard	33.8a	29.4a	85.8a	90.2	17.8	17.7b	10.6c	10.4b	2.5	2.6	25.7b	18.4
F/12/1 Mazzard	32.1b	30.1a	81.4ab	86.8	17.0	18.7a	10.9bc	10.6ab	2.6	2.8	23.8b	18.2
Mahaleb 900	29.3c	28.1ab	78.7ab	88.6	16.6	17.4b	11.1ab	10.5ab	2.5	2.7	44.0a	13.7
Mahaleb 4	28.2c	26.2b	75.3b	86.1	16.6	17.2b	11.3a	10.7a	2.8	2.7	46.2a	20.3

[1]Numbers within columns followed by the same letter are not significantly different at the 5% level. Columns with no letters have no significant differences.
[2]Measured with a durometer. Increasing values indicate firmer fruit.
[3]Smaller numbers indicate larger fruit sizes.
[4]Color was rated as: 1 = light red, 2 = red, 3 = dark red, 4 = mahogany.
[5]Yields per tree.

fruit was the largest and sweetest in 1977. In 1976, the crop load was largest (non-significant) with Redrich interstock but in 1977 it was smallest.

Rootstock appeared to have more effect on the fruit than interstock, although the effects were not completely consistent between years. Firmness, fruit weight, soluble solids, and fruit size tended to be higher with mazzard than mahaleb stocks. Yields were lower in 1976 on mazzard stocks than on mahaleb, but not in 1977. There appeared to be little relationship of yield to fruit size and firmness. Fruit size and firmness appear related and tended to be a superior with mazzard regardless of yield. In 1977, yields from Mahaleb 4 were greatest but with the smallest and softest fruit. In both years, fruit from mazzard stocks was firmer and usually larger, regardless of yield.

There were significant interstock/rootstock interactions, generally with the same trend as suggested by viewing the data for either component alone. When all possible combinations were ranked, the following fell in the top or bottom one fourth of the ranking in both years: Firmness — RR/NYM (high), MM or NS/M4 (low); Weight — MM or RR/NYM (high); Soluble Solids — NS or RR/F-12-1 (high), RR/M4 (low); Size — RR or MM/NYM (large), NS/M4 (small); Yield — MM/M4 (high). When all possible combinations were compared, the rootstock influence tended to be dominant to interstocks, and mazzard rootstocks tended to produce fruit higher in firmness, weight, soluble solids, and size.

Although the growing season has a pronounced effect on yield and quality, the foregoing information suggests that there is a significant influence of rootstock on fruit quality of cherries. Of particular interest is the positive influence on fruit size and firmness of the mazzard stocks that did not change in direct proportion to crop size.

Literature Cited

1. Bitters, W. P. 1961. Physical characters and chemical composition as affected by scions and rootstocks. Chap. 3 in W. B. Sinclair, ed. *The orange: Its biochemistry and physiology.* Univ. of Cal. Div. of Agri. Sci., Berkeley.
2. Blair, D. S. 1938. Rootstock and scion relationship in apple trees. *Sci. Agric.* 19(2):85-94.
3. Davis, L. D. and W. P. Tufts. 1936. Black-end of pears III. *Proc. Amer. Soc. Hort Sci.* 33:304-315.
4. England, D. H. 1971. The influence of rootstocks on chemical and physical characteristics of Delicious and Golden Delicious apple fruit. *Master's Thesis, Washington State University.*
5. Heppner, M. J. 1927. Pear black-end and its relation to different rootstocks. *Proc. Amer. Soc. Hort. Sci.* 24:139.
6. Hewetson, F. N. 1944. Growth and yields of McIntosh apple trees as influenced by the use of various intermediate stem pieces *Proc. Amer. Soc. Hort. Sci.* 45:181-186.
7. Mann, A. J., F. W. Keane, and K. Lapins. 1953. Apple frameworks and rootstocks in British Columbia. *Publ. Exp. Fms. Ser. Dept. Agr., Ottawa* 898: 7-26.
8. Rogers, W. S. 1926. Rootstock effect on color and size of apples. *E. Malling Res. Sta. Ann. Rpt. for 1925,* II, pp. 16-32.
9. Rogers, W. S. and A. B. Beakbane 1957. Stock and scion relations. *Ann. Rev. Plant Phys.* 8:217-236.
10. Shaw, J. K. 1946. The influence of Malling clonal rootstocks on the growth of certain apple varieties. *Proc. Amer. Soc. Hort. Sci.* 48:171-179.
11. Tukey, H. B. and K. D. Brase. 1941. Three-vear performance of sixteen varieties of apples on Malling IX stock *Proc. Amer. Soc. Hort. Sci.* 38:321-327.
12. Tukey, H. B. 1964. *Dwarfed fruit trees.* The MacMillan Co., New York, pp. 453-455.
13. Upshall, W. H. 1943. Malling stocks and French Crab seedlings as stocks for five varieties of apples. III. *Sci. Agric.* 23(9):537-545.