relatively low levels of all essential elements in trees on Marianna rootstock. This is the clearest evidence for partial incompatibility in the entire study and generally substantiates the results reported by Breen and Muraoke (1). However, in the present study the trees were not completely incompatible, having survived for 12 years or more.

Element-pair correlations were strikingly different between tree on peach and on plum rootstock (Table 7). Thirty significant correlations were different between the two types of rootstock and only three were similar. No clear conclusion can be drawn from these data as to their possible relationship to graft compatibility.

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Performance of Several Peach Cultivars on *Prunus tomentosa* and *Prunus besseyi* in Maryland

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Since the fruit industry has accepted semi-dwarf and dwarf apple orchards, researchers have considered high density peach orchards to be an essential goal for greater returns (1, 2, 3). Different peach rootstocks and double-worked trees have been investigated for tree size, control, stock/scion compatability and suckering (4).

The use of *Prunus tomentosa* (Nanking Cherry) and *Prunus besseyi*, (Western Sand Cherry) as a rootstock for peach has not been commercially acceptable. However, there are few published data particularly as to cultivar compatibility. The objective of this study was to investigate the compatibility of several peach cultivars grafted onto *P. tomentosa* and *P. besseyi* and to measure yield and potential use in intensive orchard plantings.

Materials & Methods

Rootstocks were purchased from a local nursery and planted in a nursery row at College Park, Maryland, in November 1974. The nursery was hand weeded and nitrogen was applied in the spring before and after budding. Trees were grown in well drained fertile soil. Bud sticks were taken from

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a nearby cultivar block and trees were budded between July 29 and August 20, 1975.

Trees were hand dug in November of 1976, tied in bundles and covered with microfoam until March 1977. Nursery trees were selected according to successful bud growth and planted at College Park in 1977 at 8 x 12 ft. Not all of the viable trees were planted due to lack of space at College Park. However, six Redhaven and seven Harbrite/P. tomentosa additional trees which were nearly the same in trunk circumference, and vigor as those planted at College Park were planted on the Eastern shore near Queenstown, Maryland. At planting, lime and phosphorus were placed in the tree hole and .05 pound actual nitrogen applied 2 weeks after planting and again the following year. The trees were watered in at planting. All trees received 2 gallons of water per tree, per day, the first year (1977) and 4 gallons of water trickle irrigation per tree per day, during June, July and August 1978. Due to the rootstock influence on tree growth, very minimal dormant pruning occurred in the spring of 1978.

Tree survival, fruit size and weight and observation on tree structure, tree size and performance were recorded.

Results

Redhaven, Compact Redhaven and Harbrite had the highest number of growing buds on *P. tomentosa* (Table 1). Harbrite, Redhaven, Candor, Redskin and Marland had the highest percentage of buds growing on *P. besseyi.* Candor, Reliance, So Good, Marglow, Marhigh, Marland, Marqueen, Marpride and Marsun had no buds growing. There were no *P. besseyi* trees budded to Reliance, So Good, Marglow, Marhigh, Marqueen, Marpride or Marsun because seven days after the first budding, the bark of *P. bes-*

Table 1. Percentage of bud takes and growth of several peach cultivars on *Prunus tomentosa* and *besseyi* as dwarfing rootstocks, Maryland, 1976.

Cultivar[1]	Trees budded		Bud growth	
	P. tomentosa Number	P. besseyi[2] Number	P. tomentosa Number (%)	P. besseyi Number (%)
Candor	20	20	6 (30)	9 (45)
Red Haven	20	21	13 (65)	10 (48)
Compact Redhaven	21	20	13 (65)	6 (30)
Harbrite	21	20	16 (76)	16 (80)
Reliance	18	—	7 (39)	———
Marglow	6	—	0	———
Redskin	20	20	8 (40)	9 (45)
Marland	20	20	5 (25)	9 (45)
So Good	6	—	2 (33)	———
Marhigh	6	—	2 (33)	———
Marqueen	6	—	1 (17)	———
Marpride	6	—	0	———
Marsun	6	—	0	———

[1]In order of ripening
[2]No trees budded.

seyi would not slip and became difficult to loosen.

Yields and survival were recorded in the second leaf (Table 2). Candor, Compact Redhaven, Redhaven, Harbrite and *P. tomentosa* were all growing 2 years after planting. However, Redhaven, Compact Redhaven and Marland had the highest survival on *P. besseyi*. Redhaven and Harbrite on *P. besseyi* had the highest yield per tree. Redhaven and Reliance had the highest yield per tree on *P. tomentosa*. Fruit size on either rootstock was ¼ to ½ inch smaller from the same cultivars in an adjacent planting. However the adjacent planting was 2 years old on standard rootstocks. The dwarf trees lacked vigor compared with standard trees and fruit size was smaller.

The Redhaven/*P. tomentosa* and Harbrite/*P. besseyi* trees on the Eastern shore were more vigorous on the slightly heavier soil and had larger fruit. At the end of the 3rd leaf only 1 Harbrite tree was weak. No yields were recorded for this plot.

Discussion

The authors considered 60% or greater bud survival as an acceptable level of bud take in the nursery. Only 3 cultivars, on *P. tomentosa* and two on *P. besseyi* met this criteria (Table 1). Under high density systems, where an early return on the investment is essential, no more than 5% tree loss can be tolerated commercially during the first bearing years. Only 3 cultivars on *P. tomentosa* and 2 on *P. besseyi* met this criteria (Table 2).

Although tree survival in the nursery and in the orchard was extremely low for a majority of cultivars, fruit yield, based on 8 x 12 planting, would have yielded 5,085 pounds per acre (Redhaven/*P. besseyi*) or nearly $1,000/acre (20¢/lb) one year after planting. In the 3rd leaf, it appears that most cultivars can be planted at 8 x 12 ft. Most trees are 6 feet tall while Compact Redhaven is 3.5 feet tall. Even though root suckers were prominent on *P. tomentosa*, suckers were not of any major problem. Pruning was minimal and much less than a standard tree of the same age.

When trees were being planted, it was evident through the reddish color of some rootstocks and vigor of the scion that some trees would not grow. Therefore, some of the orchard tree loss might be prevented by visible inspection before planting.

This study has too few trees, and years of observation for any significant conclusions. Overall, neither *P. to-*

Table 2. Percentage survival of peach trees after two growing seasons, and yield per tree. Maryland, 1978.

	Rootstock — % Survival		Yield (lbs)/tree	
Cultivar	P. tomentosa	P. besseyi	P. tomentosa	P. besseyi
Candor	100	33	6.1	4.5
Redhaven	100	100	9.6	11.2
Compact Redhaven	100	100	7.8	7.4
Harbrite	88	56	3.7	11.5
Reliance	39	—	9.9	—
Redskin	33	50	6.3	6.5
Marland	0	75	0	6.0
Marhigh[1]	100	—	1.7	—

[1]Trees not living in the 3rd leaf, 1979.

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.

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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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