jury being apparent in the phloem-fiber tissue (Figs. 3, 4 and 5).

Death of the ray cells (Figs. 4 and 5) indicates the severity of the malfunction of these tissues, thus making it impossible for translocation from the leaves to the roots. This whole area engulfs the functioning phloem and is adjacent to the cambial zone. Injury apparently was due to excess soil moisture near the tree trunk and the graft-union.

A longitudinal section through the functioning phloem of 'Starking' appear to be normal, with uninjured functioning tissues between the sieve tubes and plates (Fig. 6). However, necrotic tissues are apparent between the phloem-ray cells (Fig. 7). Some of the phloem-ray cells themselves are also necrotic. Bark necrosis might be accentuated by this condition.

Phloem tissue of MM 104 shows a marked decrease in size of the phloem-ray cells as compared with that of 'Starking' (Figs. 8 and 9). However, the size of sieve tubes and plates were greater, accounting for the thick, spongy bark that was found in the graft-union area.

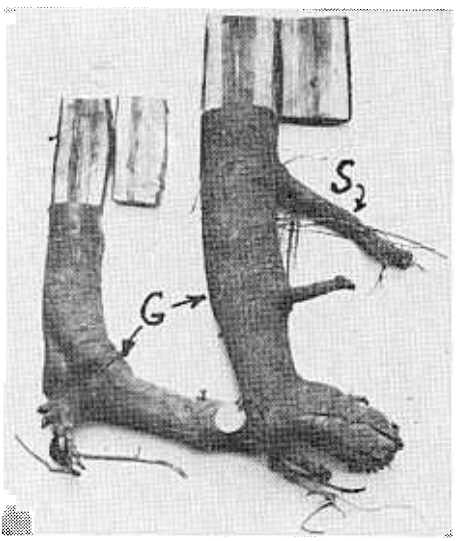
These findings stress the need for careful selection of site and soil for MM 104. It is imperative that a well-drained soil be selected, since this rootstock is sensitive to wet soil conditions.

Literature Cited

1. Tukey, H. B. 1964. Dwarfed fruit trees. The MacMillan Company, N. Y.
2. Simons, R. K. and R. F. Carlson. 1968. Characteristics and propagation of rootstocks for deciduous fruits in the North Central Region, 1966-67. HortScience 3:221-225.
3. ———. 1968. Phloem tissue development in the stock/scion union of East Malling IX apple rootstock. Hort. Res. 8:97-103.

Myrobalan Selections As Rootstocks* for Plum

R. F. CARLSON**



Variable degrees of incompatibility in the graft union of 'Stanley' plum on 'Myrobalan' rootstock has been observed during the last decade. In commercial plum orchards in Michigan, many trees have been observed to decline in the sixth year in the orchard, when they come into fruit. Such trees have been found to have a reduced root system and an enlarged trunk immediately above the graft (Fig. 1). The rootstock portion of the trunk is

Fig. 1. Portions of two plum trees, as found in a commercial orchard. Note weak tree (left) with one large root coming from the graft union. The tree to the right had a larger root system and scion roots (top right), but also a reduced trunk diameter below graft union. Both trees were in the 6th growing season. G = graft union and S = scion-root.

*This report on plum rootstock selections is a cooperative project between Gerber Product Company and Michigan State University. Sincere thanks for their help are due Norman Reath and James Breinling, both of Gerbers; and to Gerald Mann, of Fennville, Michigan, on whose farm the test was done.

**Professor of Horticulture, Michigan State University, East Lansing, Michigan 48823.

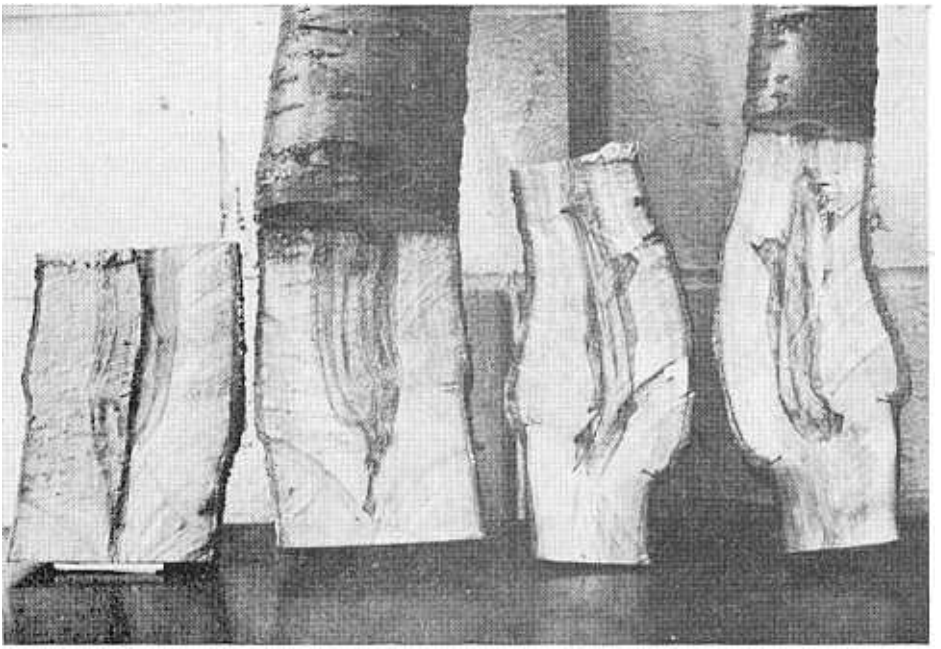


Fig. 2. Longitudinal section through the graft union showing, left, perfect union of Myrobalan #20 rootstock with Stanley scion; and right, Myrobalan #21, showing constriction at the union with Stanley of the same age.

much reduced, giving the appearance of a constriction in the graft union area. This disorder has been referred to as the "constriction disease" of plums.

The purpose of the study here reported was to test several Mycrobalan seedling selections to determine if any of them would be more compatible, as rootstocks, with 'Stanley' plum.

The test planting was initiated May, 1965, on a rather heavy clay-loam soil site near Fennville, Michigan. Eight 'Myrobablan' seedling selections from seed of different virus indexed trees were used as rootstocks for the 'Stanley' plum variety. The trees were propagated by the late Professor Karl Brase, Geneva, New York.

During the first seven years, several trees showed signs of weakness and decline symptoms. When some of these trees died, they were replaced by trees of 'Stanley' on ordinary 'Myrobalan' rootstocks. The dead trees were examined, and in most cases, it was found that the scion had over-grown the rootstosk at the graft union (Fig. 2). The scion over-growth (increased circumference) extended 6 to 8 inches upward on the trunk above the graft. This over-growth consisted of thick bark (cortical tissue) and large annual growth rings (xylem tissue), in comparison to the much compressed growth of the same tissues in the rootstock portion of the trunk. For example, in sample measurements, it was found that the trunk circumference, measured one inch above and below the graft union, was 40 centimeters for both the scion and the stock of normal trees on Myrobalan #20. However, the trunk circumference of weak trees on Myrobalan #21 was 36 centimeters above the graft (scion) and 22 centimeters below the graft (stock).

After seven growing seasons, tree

survival ranged from 40 to 85 percent. Myrobalan #20 ranked highest and Myrobalan #23 lowest, in survival (Table 1).

The Myrobalan #20 selection produced the most uniform and vigorous trees as rootstock for 'Stanley' plum. The graft unions of these trees were very strong, with very little overgrowth. This selection is being increased by vegetative means with the aim of establishing one or more Myrobalan clones as rootstocks for plum varieties.

Table 1. Tree survival of 'Stanley' plum on different Myrobalan rootstock selections planted in 1965.

Rootstock Selection	Number of trees planted	Number of trees alive in 1971	Percent trees alive
Myrobalan #6	10	8	80
" #8	31	20	66
" #10	26	17	65
" #20	49	43	87
" #21	36	27	75
" #23	15	6	40
" #25	27	18	66
" #27	29	13	48

Clive (Cy) E. Russell
(1896-1971)

Cy Russell, retired Associate Professor, Michigan State University, was killed in a car accident in Lansing, Michigan, at the age of 75. His many former students, especially those who majored in Pomology, will remember him as a skilled and dedicated teacher of horticulture.

Cy was born in Manton, Michigan. He received a B.S. Degree from Michigan State College. in 1926, and an M.S. Degree in 1928 from Oregon State College. His first position was that of Lecturer at MacDonald College, at Ste. Anne de Bellvue, Quebec, Canada, from 1926 to 1927. He then went to Texas Technological College, Lubbock, Texas, as Associate Professor of Horticulture (1928-31), becoming Professor and Head of the Department of Plant Industry at the same institution (1931-1937).

He joined the staff of the Department of Horticulture at Michigan State College in 1937, where he devoted the remaining 24 years of his professional life to advising undergraduates, and teaching the introductory course in horticulture and a series of pomology courses. He published a book entitled, "General Horticulture Laboratory Manual," in 1949. He also contributed substantially to another book entitled, "A Dictionary of Agricultural and Allied Terminology," edited by John Winburne, and published in 1962.—*G. M. Kessler*