Observations of Apple Rootstocks, Interstocks, Bodystocks, and Cultivars in Southwest Iowa

C. C. DOLL[1]

The Bluffs Experimental Fruit Farm near Council Bluffs, Iowa, was visited in the fall of 1973 to observe growth and development of experimental apple plantings since its closing in 1965.

This farm was developed and operated by Iowa State University from 1946 to 1965 to study fruit production in SW Iowa. Apples were the leading fruit crop in the area and much of the research and demonstration work at the farm pertained to apple stocks.

After the termination of research in 1965, the farm and its plantings were purchased by a professional man who has given the plantings less than professional care as judged by commercial standards. It was the experimental plantings on this farm, many of which were made by the author, that were observed after eight years of marginal care during infestations of scab, cedar rust, fireblight, insects, mice and gophers.

The stocks and cultivars that have survived this period of time might possess resistance and tolerance characteristics desired by breeders or orchardists. The following observations should be taken in this context.

CLONAL ROOTSTOCKS

(1) A planting of the East Malling and Malling-Merton series of rootstocks plus a few selections of dwarfing and/or hardy stocks was made in 1962 to observe the natural growth and fruiting habit without scion influence. All trees were own-rooted when planted.

In 1973, 12 years after planting, none of the 'EM' and MM' stocks in this test were present. Only the following cultivars survived the eight years of sub-standard cultural conditions and the fireblight infections and other pestilence conditions mentioned previously .

'Carter Virginia Crab'[2]—vigorous, but showed severe scab and some fireblight infections.

'Beauty Crab'—vigorous; leaves and fruit were free of scab, cedar rust, and fireblight; two trees of this cultivar survived.

'Olga Crab'—medium in vigor, but tended to be dwarfish and spreading with a height of eight feet; moderate scab on fruit and leaves.

'Kitaika' — moderately vigorous; well-shaped semi-dwarf type tree with good crotch angles; light scab infections.

***'M. prunifolia* (P.I. 205559)'**—vigorous and free from diseases; more spreading than 'Beauty'.

These observational notes indicate that one or more of these cultivars, especially 'Olga', 'Kitaika', and *'M. prunifolia'* might have a place in a rootstock or bodystock test because of their structural and disease resistant characteristics plus their durability.

[1]Area Extension Adviser in Fruits and Vegetables, Cooperative Extension Service, University of Illinois, and formerly Superintendent of Iowa University's Bluffs Experimental Fruit Farm.

[2]From a Virginia Crab body stock tree on the Edwin Carter farm at Glenwood, Iowa.

More detailed descriptions of 'Beauty', 'Kitaika', and 'Olga' are given in "Preliminary Evaluation and Description of Domestic and Introduced Fruit Plants," South Dakota State College Bulletin 471, 1958, and these observations are in agreement with those therein.

(2) A 10-year old planting of 'Golden Delicious', 'Royal Red Delicious', and 'Chieftain' on 'MM 104' and 'MM 106' stocks showed possible stock/scion effects. Ninety percent of the 'Chieftain' trees survived, whereas only 60 percent of the 'Golden Delicious' and 40 percent of the 'Red Delicious' survived. There wasn't much difference in stock survival, with 67 percent of the 'MM 104' and 60 percent of the 'MM 106' present. Some reduction in tree size was surmised, but no seedling-rooted trees were available for comparisons.

(3) The 'M.26' stock had not been included in any replicated plantings because of its observed susceptibility of fireblight in propagation trials at the farm. However, a 1965 planting of five 'Chieftain' and five 'Royal Red Delicious' on 'M.26' had four trees of each surviving by 1973. The trees were sturdy and desirable in appearance.

INTERSTEMS

Interstem trees had a historical significance in Iowa because of the work with 'Clark' by Professor Tom Maney and others. 'Clark' was frequently used as an interstem to compare dwarfed trees with other clones. The first planting of 'Clark' interstem trees at the Bluffs Experimental Fruit Farm was in 1946 and was followed by a larger replicated planting in 1954. Many trees from these plantings were lost through the years, but those that survived were viewed as sturdy, productive and dwarfed in 1973.

A third planting, made in 1959, consisted of 'Jonathan' and 'Delicious' on 'Clark', 'K-41' and 'M.7' interstems on seedling roots. The percent survival of this planting is given in Table 1.

Many of the 'Delicious'/'Clark' trees had been lost prior to the stress conditions of the past eight years. The few that survived were good, semi-dwarf trees, as were 'Jonathan' on both 'Clark' and 'M.7'. Both cultivars on 'K-41' had a good rate of survival, but the trees were classified as moderately vigorous, with tree size being comparable to that expected from 'MM 111' stocks. The 'K-41' interstem would be rated too vigorous for high density planting.

Table 1. Percent survival of 15-year old Interstem Apple Trees.

	Percent Survival		
Cultivar	Clark	K-41	M.7

BODYSTOCKS

Following the November 11, 1940, freeze, 'Virginia Crab' was used as a body stock for many orchards in Iowa. Observations of a bodystock test block planted in 1946 showed the 'Virginia Crab' stocks with stem-pitting virus symptoms were dwarfed and willowy and in a serious state of decline after 28 years. This was especially true of 'Red' and 'Golden Delicious'. However, 'Virginia Crab' bodyworked trees without stem-pitting-virus symptoms were the most vigorous trees in the block. An outstanding combination for semi-dwarf characteristics was 'Red Sharon' on 'Virginia Crab' (with stem-pitting-virus symptoms) at the age of 23 years.

CULTIVAR NOTE

'Chieftain' was outstanding as a scion cultivar in its durability in guard

rows and other observational plantings. It produced a very attractive dwarf tree on 'M.26' and a nice semi-dwarf on 'MM 106'. (In a commercial planting nearby, it also was very attractive in fruit). It showed resistance to apple scab in 1973 and this might be one of the reasons for its survival and growth at this location.

CONCLUSIONS

Based on observations after eight years of growth of own-rooted trees in a semi-neglected situation, 'Beauty Crab', 'Olgo Crab', 'Kitaika' and '*M. prunifolia*' (P.I. 205559) should be considered in stock or breeding stocks because of their durability and tree characteristics. In a comparable situation, no 'EM' or 'MM' clones survived. Other test plantings that included 'M.7', 'M.26', 'MM 104' and 'MM 106' as rootstocks, had generally low percentages of tree survival. The same was true of 'Clark' interstems. 'K-41' interstem trees had an acceptable survival rate (88% after 15 years) but were too vigorous for use in high density plantings.

The concept of body working 'Virginia Crab' is archaic in most areas, but the 'Red Sharon' scion yielded a sturdy, productive semi-dwarf tree in the 23rd year. It produced vigorous large trees when topworked to 'Red Delicious' and 'Golden Delicious' in the absence of stem-pitting virus.

'Chieftain' showed promise as a new cultivar because of favorable growth and fruiting on 'M.26', 'MM 104' and 'MM 106' stocks, even under stress conditions.

Pear Rootstock Research in Oregon

PORTER B. LOMBARD AND MELVIN N. WESTWOOD[1]

F. C. Reimer began the search before 1915 for pear rootstocks and interstocks resistant to fireblight. He made two extensive trips to China for seed from native stands of various *Pyrus* species. From these he introduced to the west coast pear industry, such rootstocks as *P. ussuriensis* Max., *P. pyrifolia* (Burm.) Nak., *P. calleryana* Decne., and *P. betulaefolia* Bunge. Also, he (2) selected several *P. communis* L. cultivars resistant to fireblight which were used as interstocks, such as 'Old Home' and 'Farmingdale.' And, seedlings from the crossing of 'Old Home' x 'Farmingdale' (OH x F) were found to be acceptable pear rootstocks.

The rootstock plots Reimer established during the 1920's and 1930's proved important for evaluating resistance to the mycoplasma-induced bud union disorder pear decline which spread through Oregon in the 1950s. Seedlings found to be susceptible to pear decline were *P. ussuriensis* and *P. pyrifolia*, while *P. betulaefolia* and OH x F seedling rootstocks and rooted 'Old Home' interstock trees (1) were the most resistant. Domestic *P. communis* and *P. calleryana* seedlings were moderately resistant (4).

The spread of pear decline in Oregon in the 1950s prompted a new search for pear rootstocks which would: 1) provide resistance to pear decline, fireblight, and other pests; 2) withstand various soil conditions such as heavy clay to light soils; and wet to dry soils; 3) provide high yield efficiency, i.e., high yield per unit of tree size; 4) provide a range of tree

[1]Oregon State University, Corvallis.