Study of Rootstocks for Sweet Cherries in California

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The California sweet cherry industry has long been plagued with problems causing loss of tree vigor, dieback and death. A widespread epidemic of cherry buckskin (Western X-disease) was a major reason for the dramatic reduction in sweet cherry production in some northern California areas during the 1930s to 1940s (9). The cause of such severe loss was due to the Napa Valley strain of the disease (10). The less virulent Green Valley strain, known to exist in San Joaquin County, can also cause fairly severe losses.

Not all tree losses have been explainable on the basis of buckskin, however. In 1974 the recognition of widespread infections of *Prunus* stem pitting caused by a strain of tomato ring spot virus (6) and epidemic invasions by several species of root and crown rot causing *Phytophthora* fungi (4, 5, 7) established these agents as being strong contributors to the overall tree dieback problem.

Many sweet cherry orchards are planted on soils with impaired internal drainage caused by soil stratification and/or high bulk densities of the soil. This factor markedly contributed to the decline problem. These soil conditions, especially during periods of abnormally heavy rainfall or surface irrigation, accentuate development and incidence of *Phytophthora* crown and root rot. Prolonged saturation of soil also may result in reduced oxygen diffusion rates causing root suffocation. Another cause of reduced tree vigor resulting in dieback conditions is incompatibility between rootstock and certain cultivars.

Bacterial canker caused by *Pseudomonas syringae,* limb canker caused by *Cytospora leucostoma,* and crown and root damage attributable to pocket gophers and voles are other causes of the dieback malady.

The majority of California's sweet cherry trees are on mahaleb seedling *(Prunus mahaleb)* rootstocks, resulting in trees that are susceptible to most of the above-named causes of cherry dieback.

The reasons for the selection of mahaleb as the rootstock of choice are varied. First and foremost is its recognized ability to reduce losses caused by cherry buckskin (2). Mahaleb rootstock has been observed to be moderately dwarfing compared to mazzard *(Prunus avium)* and there are indications that the higher a mahaleb rootstock is grafted the more dwarfing effect it has on the tree. In addition, trees on mahaleb are generally regarded as more precocious than trees on mazzard. Mahaleb rootstock has proven over time to be more generally adapted to light textured, droughty soils and is often preferred for this use.

Mazzard seedling rootstock gives high vigor and does not induce precocity, resulting often in very large trees. These factors combined with its susceptibility to buckskin have caused mazzard to be in disfavor with producers. It does show some resistance to *Phytophthora* crown and root rots (4, 7). Some selections of mazzard also are resistant to *Prunus* stem pitting (6).

A sour cherry rootstock, Stockton Morello (*P. cerasus* L.) has been used to a limited extent in California cherry orchards since the early 1900s (1, 3). This stock does provide some tree size control, but is often variable in this characteristic and usually does not provide much more size control than

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mahaleb. Stockton Morello is more tolerant to heavy, wet soils than the other two cherry rootstocks, but it is very sensitive to *Prunus* stem pitting (1, 6, 8). Fruit produced on trees on this stock may be delayed in maturity and smaller in size (8).

A selection of Vladimir sour cherry *(P. cerasus L.)* was established at the University of California, Davis farm, by the late Carl J. Hansen. This stock can provide trees about one-third the size of sweet cherries on mahaleb, but it tends to lean badly and may require staking or trellising for support. It also tends to root sucker very severely (11). Its susceptibility to the various diseases causing tree decline is unknown.

Studies have recently been initiated to find rootstock materials resistant to the most serious disease problems causing tree decline in California. Cherry rootstock material available from other states and countries is being brought into California and established. Once established these items will be propagated by cuttings and/or seed and then screened for resistance to the major disease problems, in cooperation with plant pathologists.

Materials that show resistance will then be evaluated for compatibility with important cultivars, three size control, induction of precocity, tolerance to impaired soil aeration and other horticultural characteristics.

In addition to rootstocks, interstocks are also being investigated as a means of tree size control and disease resistance. Mazzard rootstocks with mahaleb interstocks may offer several advantages. Some selections of mazzard appear to be resistant to *Prunus* stem pitting. The mazzard is also more resistant to *Phytophthora* spp. than mahaleb. the mahaleb interstock could then be topworked with the scion cultivar to multiple scaffolds to minimize losses caused by buckskin and bacterial canker and in addition provide some tree size regulation and induce a degree of precociousness not found in the mazzard understock. Trees to test this concept were planted in commercial orchard sites in several locations during the spring of 1977.

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