PROJECT NO: 5263 **TERMINATION REPORT**

TITLE: High Density Cherry Culture

YR INITIATED: 1985 **CURRENT YR:** 1992 **TERMINATION YR:** 1991

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This project continued a line of research that began with Alar as a growth retardant, looked carefully at several growth regulators up to and including Cultar, tested root pruning, regulated deficit irrigation and scoring. Our first interest in rootstocks came with Colt, which Ron Tukey arranged to import from East Malling with several other selections from that program.

Root pruning, regulated deficit irrigation, and scoring all increased fruitfulness slightly in the fourth and fifth leaf, but had little or no effect on tree size. All three techniques were judged to be more trouble than the small benefits would justify.

Cultar controlled growth very well. Trees treated in 1982 at high rates still show growth control at the end of 1991. Had Cultar been approved for use on cherries in the United States it might have been a valuable means to limit excessive tree growth, but not without more research than has been done to date. Work to develop treatments at lower rates to control growth in the short term without suppressing it for years was not done. The soil residue and persistence of the chemical was not addressed. Annual cropping was suspect, probably associated with early blooming induced by Cultar. There were problems, but it would have been an interesting practice to work into cherry culture had we been given that opportunity.

Pruning and training is the size control method of choice with sweet cherries at the present time. Cherries probably respond less satisfactorily to limb positioning and pruning than does apple. Nevertheless, if you remove part of the tree it is dwarfed by that amount. Tipping delays fruiting on the shoot tipped. Summer pruning of bearing trees to allow light penetration increases fruitfulness of interior buds and is somewhat dwarfing. It is questionable whether it is desirable to increase fruitfulness of interior buds on quality grounds. In general, thinning out cuts seem to control tree size and allow more fruiting while heading cuts into bearing wood reduce current year's fruiting and stimulate vigorous new growth. Pruning at about shuck fall is an opportunity to control excessive fruit set, remove weaker, poorly exposed wood and thereby increase fruit size with about the same loss of yield as if

the same cuts had been made during dormancy. There is a great range of questions relating to the response of cherries to pruning that warrant careful research.

Root restriction as a potentially useful technique to control tree size and fruitfulness came to our attention through our research with trickle irrigation on apples that lead to studies of root/shoot relationships. Work elsewhere that tested a fabric capable of allowing water to pass through but not roots seemed to be a good idea for cherry experiments. We are four years into that experiment. We have found that the tree responds to severe root restriction within a few weeks by closing down its stomata. After four years growth is proportional to soil volume but with considerable variability. Some of the variability comes from roots that have escaped from the containers we built from the fabric. Preliminary observations suggest that successful root escapes are from seams in the containers. Where roots have grown through the fabric they seem to be dying, presumably by constriction. In the continuous beds where the fabric was not cut up and reshaped there will probably be fewer escapes. The trees on the Tatura mini-trellis, now three years old, are pretty well controlled. A few cherries were borne this year though most were lost to the winter freeze. The fourth leaf crop will still be light on Bing, better on Rainier. In the root volume experiment the smallest volumes are not very fruitful nor are the largest volumes. The best cropping seems to be in the middle range, 1/3 to 1 cubic meter per tree. The experiment still looks promising but not a sure success.

Bing clones show promise of offering some benefits in fruit quality along with some size control. The size control may not be sufficient to excite anyone by itself but combined with a rootstock that, in turn may not be very dwarfing, could be a successful tree. The material may increase our options. The Bing clone story will be told in more detail in the fruit quality project. The interesting question that has developed is whether the observed responses are a result of genetic differences or to differences in strains of the pollen-borne viruses carried in the clones.

The irradiation-induced mutants of Bing from Maxine Thompson's program at Corvallis are also semi-promising. The largest trees are the standard Bing. The size range is not large and the variability is considerable. These trees have not yet borne a good crop to evaluate quality. We will watch the development of these trees and coordinate closely with developments in companion plantings in Oregon. Definitive answers from the Prosser plots are unlikely.

The NC-140 cherry rootstock planting with Bing as the scion variety continues to look very good. The planting with Montmorency as the scion variety is near Basin City and we have not been able to stay on top of performance there. The Bing planting in its fifth leaf in 1991 permits some preliminary conclusions. Colt is not dwarfing nor very fruitful at this age. The two MxM selections are similar as is Mazzard. All of the verticillium wilt and zinc deficiency observed so far are on these vigorous rootstocks. Of the Gembloux group of rootstocks only GM79 looks good. It is not dwarfing but is much more fruitful than the above group. GM9 is very dwarfing, difficult to start growing, not fruitful in spite of the small tree, and with small fruit. GM9 is totally unacceptable based on its performance to date. GM61/1, planted quite extensively in Northwest commercial trials, has been dwarfing but not fruitful in the Prosser experiment. The Giessen series of rootstocks include one outstanding candidate, GI148/8. That rootstock produced trees that were dwarfed, very fruitful, therefore with very high fruiting efficiency, and with relatively large fruit, especially considering the crop load. The rootstock suckers slightly, probably not enough that it can't be overlooked in view of the other outstanding characteristics displayed thus far. Some of the Giessen rootstocks will be eliminated on the basis of suckering but several that look less promising than 148/8 may emerge as successful material because of some other character even though they may be only slightly smaller than Mazzard and considerably more fruitful. Such a character may turn out to be ease of propagation. We are told by nurserymen that propagation is a problem with some of these rootstocks. The coordinated cherry research program may want to look at propagation of the Giessen rootstocks as a future project for funding.

Older rootstock trials show nothing outstanding. Colt has been ordinary except that we have yet to lose a tree on Colt. The other rootstock selections from East Malling were also undistinguished in their performance with Bing. MXM 14 and 39 are somewhat dwarfing but require crop controlling pruning in order to maintain adequate fruit size. Vladimir is very prone to suckering, not bad as an interstem.

We are much closer to substantial increases in sweet cherry productivity on younger trees and to harvesting fruit from smaller trees. When propagation gets in gear the next step will be to develop appropriate orchard systems for sweet cherries. They will draw on the apple experience but will not be the same.

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