PROJECT NO.: 6263 **TERMINATION REPORT**

TITLE: Orchard Factors Affecting Cherry Firmness and Quality

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

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This project has sought to develop orchard techniques that will help to improve cherry quality. Cherry quality has been measured as large fruit, firm cherries, high soluble solids, and resistance to or avoidance of cracking. At the interface between orchard practices and post harvest practices is harvest technique to avoid damaging the fruit, thereby preserving the quality grown into the fruit. Growing cherries on smaller trees might make careful picking more likely. Destroying quality is much easier than producing it.

During the life of this project it became necessary to incorporate the remnants of the Toyama breeding project in order to protect the WSU investment in that defunct program. Evaluating selections and developing new varieties from the program became the main emphasis of this project. To help do this a non-profit corporation, the Central Washington Nursery Improvement Institute (CWNII), was formed. CWNII has helped to decide which selections to advance to variety status, has propagated trees and placed them with progressive growers, and has patented the varieties in the name of WSU. Royalties are split between WSU and CWNII after patent costs are returned to CWNII. Royalties on the WSU side go into a fund managed by WSU, the interest from which goes back into the variety development program.

Under this project fruit samples from all the 100 remaining selections are given a battery of quality and storage tests each year. The result is five years of quantitative quality data among genetically different selections. This body of data bears internal relationships that are quite different from those observed when all the data come from Bing that is treated in different ways. We are looking forward to more complete analysis of this and future data but an example of a surprising result is the observation that within the genetic population survival of frost is not correlated with bloom date. We have seen a tendency for softer fruit in the later maturing selections. As the trees age in their early years the fruit becomes progressively softer. Rain cracking is associated with softer cherries but there are cherry selections

that have combined relatively firm fruit with relatively low cracking in the years thus far available for analysis.

Two varieties have been named. One, Olympic, matures 4-5 days after Bing. Olympic has large, firm fruit that are quite free of blemishes, produces a large number of flowers on a relatively small tree and has the potential to be a good, reliable variety in the post Bing season. The other variety, Glacier, matures 5-7 days before Bing and is self-fertile. The cherries are very large and are favored in taste tests. The fruit is not as firm as Bing, being similar to Rainier in this regard. The variety was introduced because of interest in a home garden variety. It deserves attention as a dark fruited companion to Rainier in the field pack, high quality market. Two more very early selections that looked very good in 1991 will be named if they perform well in extensive grower trials now under way. In the collection are several selections that did well in 1991. To do well they had to survive the freeze and avoid or resist cracking. The early selections avoided the rain. Among the later selections is one that had only 1% cracking in 1991. Those are the first cracked cherries recorded from that selection in four years of data. The industry should discuss seriously the value of planting some acreage to a fairly good variety that survives rain, should this selection continue to perform as it has for four years. There is valuable material in this collection. The industry should not ignore its potential value.

A collection of 40 Bing clones showed a range of 10 days in maturity date, 12% to 54% cracking, and firmness from 520 to 820 on the MTG scale in 1990, the first year of good crops. Freeze and frost reduced the 1991 crop to barely usable levels. Nevertheless the conclusions of the previous year were essentially borne out in 1991. Those conclusions were that in this collection is the potential to harvest Bing a week later, reduce cracking dramatically, grow much firmer cherries and produce smaller trees. It also looked possible to combine most of these desirable improvements in a single clone. The possibilities become even more interesting when one realizes that these differences are, at least in part, associated with the presence of pollen borne viruses that, in other strains, cause rugose mosaic disease. The implications of this collection, which will take years to assess, are immense.

Within Bing cultural practices to improve quality, other than to use GA, have produced relatively small effects. Preventing overcropping is the most significant practice, Associated with that is assuring an adequate, healthy leaf surface. Assuming the latter, crop regulation becomes an important

quality factor. Thinning has not been practical. Caustic chemicals applied at bloom might be made to work though we have not yet been able to do so reliably. Detailed pruning shortly after bloom to remove heavily set wood in positions unlikely to produce large cherries and thinning out fruiting wood elsewhere increases fruit size nearly as effectively as dormant pruning. Everything else being equal a large sacrifice in yield is necessary to increase fruit size by one row size.

In this project we adopted the MTG, developed by Dr. Davis with TFRC funds, and have found it to be a useful instrument in our firmness evaluations. As it has the potential for semi-automation we believe further development and industry trial of this instrument would be desirable.

The world literature on sheltering cherry trees to protect the fruit against rain was reviewed in a masters thesis. Along with this some biological and engineering aspects of the problem were studied together with an economic analysis of the practice. This study remains in some demand from people contemplating sheltering of cherries in the U.S. and abroad.

Cultar might have been used in combination with GA to increase further the size and firmness of Bing. This work stopped when we learned that Cultar would not be registered in the U.S.

The effect of developing rootstocks for Bing on quality of the fruit is being monitored. So far poor quality has been associated with rootstocks that are otherwise undesirable as well. The promising rootstocks have promising fruit quality properties as well. Managing growth and fruiting of Bing on the new rootstocks to assure best quality must be part of future work.

The elements of producing high quality cherries are first to produce trees with healthy, well-distributed and well exposed foliage, then regulate the crop to moderate levels. On trees so treated GA increases fruit size and firmness. Harvest at proper maturity is a major factor in size, color, firmness and soluble solids. Multiple harvests to reduce variability in the pack would further improve quality. Careless, even routine harvest and handling practices damage good fruit. Untimely rain can ruin the whole crop. Sheltering controls cracking but only economically with the most valuable crops. New selections will greatly reduce loss to cracking but probably with fruit of lesser basic quality than Bing. Further major improvements in cherry quality must be through practices that most of the industry has been unwilling to try, much less adopt.