PROJECT NO.: 7201 (Termination Report)

TITLE: Enhancing Fruit Quality

YR INITIATED: 1998-99 **CURRENT YR:** 2000-2001 **TERMINATING YR:** 1999-2000

PERSONNEL:

Principal Investigator: G.A. Lang, Assoc. Horticulturist, WSU-Prosser
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REPORTING PERIOD: 1997-2000

ACCOMPLISHMENTS AND RESULTS:

Gibberellic acid (GA) is used commonly to enhance fruit firmness and size, as well as delay harvest for better harvest labor and market management. The ethylene-producing PGR, ethephon, can promote earlier and more uniform ripening, but sometimes reduces firmness. The ethylene biosynthesis inhibitor, ReTain (AVG, aminovinylglycine), has shown positive effects on the fruit quality of apples and, in preliminary studies, a marked influence on ripening and firmness of cherries, and possibly on stem color retention. This project examined the effects of various combinations of these growth regulators on sweet cherry fruit quality over several years.

1. ReTain Experiments

Preliminary experiments Multiple treatment combinations of ReTain and GA were established in 1998 on 35-year-old 'Bing' cherry trees (see **1998 WTFRC Report, Tables 1-4**) and in 1999 on 12-year-old 'Bing' cherry trees at WSU-Prosser's Roza Experimental Orchards. In 1998, all growth regulator single applications appeared to increase fruit size, although the increase was statistically insignificant. The greatest increase in size (and delay in ripening) was with standard GA treatment, which was also the only treatment that increased firmness (ReTain maintained firmness longer than the controls but did not increase firmness). Of the multiple applications, the treatment of GA followed by ReTain 12 days later resulted in the greatest

delay in ripening, the firmest fruit, and the largest fruit. Physiological analyses by Jim Mattheis (USDA/Wenatchee) did not show any consistent differences between treatments for fruit respiration or ethylene evolution, not a necessarily surprising result considering that cherries do not exhibit a climacteric like apples. Data from analysis of several grower trials revealed that ReTain alone generally did not increase fruit size or firmness as much as GA alone or GA in combination with ReTain.

In 1999, it was noted that none of the 1998 growth regulator treatments had any apparent effect on return bloom of sweet cherry, even at the highest rates. The ripening and harvest effects of the growth regulator treatments are shown in Table 1 (see below). At commercial harvest for fruit with a standard GA treatment, those fruit that had an additional late ReTain treatment (6/23, one week before normal harvest) were largest. There were no other remarkable differences in fruit size between the 6/30 samples and no statistical differences in fruit size between the 7/5 samples. Fruit with the additional GA treatment at one week before normal harvest appeared to be the most delayed in ripening, as measured by the delay in soluble solids accumulation in the 6/30 samples. Surprisingly, the additional GA treatment at two weeks before normal harvest appeared to advance ripening, having the smallest fruit size, highest soluble solids, and a significant decline in fruit firmness from 6/30 to 7/5. This contrasted with the additional ReTain treatment at two weeks before normal harvest, which maintained the highest fruit firmness. The 1998 and 1999 ReTain fruit firmness results were not consistent across years, for reasons as yet unknown.

Fruit harvested on 7/5 from the 1999 growth regulator treatments were held in cold storage and sampled weekly for 5 weeks to analyze losses of fruit quality. There were no significant or consistent differences in postharvest change in fruit size, soluble solids, and fruit firmness between growth regulator treatments. Titratable acidity analyses from these samples are still being conducted at the time of this report. Preliminary (partial sample analysis) results confirm the expected decrease in titratable acidity during postharvest storage of fruit having a standard GA treatment (application at straw color). However, some data from fruit having a standard GA treatment plus a follow-up treatment of either GA or ReTain appear to possibly have a less rapid loss of acidity; if verified, this would suggest a greater retention of flavor during postharvest storage.

2. *Ethrel Experiments*

Multiple treatment combinations of Ethrel, ReTain, and GA were established in 1998 on 12-year-old 'Bing' cherry trees (see **1998 WFTRC Report, Tables 5-7**) at WSU-Prosser's Roza Experimental Orchards. All Ethrel treatments significantly reduced the force required to separate the stem from the fruit (as for stemless cherry harvest), with the magnitude of reduction being proportional to the rate of Ethrel. All of the Ethrel treatment combinations with GA or ReTain also exhibited significant reductions in stem removal force, suggesting that neither can override the physiological induction of stem abscission by Ethrel. ReTain pretreatment appeared to reduce fruit firmness, which GA pretreatment delayed ripening. When added to the Ethrel treatment in the spray tank, ReTain also delayed ripening.

3. *Propel Experiments*

Multiple rates and timings of Propel were conducted in 1997 and 1998 on 'Bing' and 'Rainier' cherries at WSU-Prosser's Roza Experimental orchards as well as commercial orchards in Orondo and Bridgeport (see **1998 WTFRC Report, Tables 8-10**). There were no clear trends or significant differences in ripening or any fruit quality parameter, on a consistent basis, that warranted further experimentation.

PUBLICATIONS:

Lang, G.A. 1999. Experimental use of ReTain in cherries. *Good Fruit Grower* 50(10):29-32.

Table 1 Post-straw color treatments (17 and 23 June) of ReTain and GA applied to 12-year-old trees of 'Bing' cherry that were previously treated at straw (11 June) color with a standard GA application.

Treatment	Fruit Size (g) 6/30	7/5	Soluble solids 6/30	7/5	Firmness 6/30	7/5
GA alone	7.8ab	8.8a	16.4b	18.1c	230c	192c
GA + GA 6/17	7.4b	8.0a	17.5a	19.5a	239b	194c
GA + GA 6/23	8.0ab	8.6a	15.8c	19.0ab	240b	202b
GA + ReT 6/17	7.7ab	8.5a	16.4b	18.3c	249a	225a
GA + ReT 6/23	8.4a	8.7a	16.4b	18.5bc	232bc	207b