FINAL REPORT
WTFRC Project # CH-01-08

Project Title: Mechanical Harvester for Fresh Market Quality Stemless Sweet Cherries

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Objectives: The principal objective of this research was to develop a mechanical harvesting system for stemless, fresh market quality sweet cherries. Secondary objectives were to: (1) determine compatible tree training and cultural practices, (2) develop an effective fruit removal actuator and positioning system, (3) develop fruit catching/collecting components that minimize damage, and (4) test the system under field conditions to determine feasibility. Objectives for 2003 were: (a) to improve the bin handling system and, (b) continue extensive testing under "commercial" conditions to elucidate harvester performance with various training systems and cultural practices.

Significant findings:

- An improved bin handling system was developed so that both harvester halves could deposit filled bins to the ground. Empty bins were spotted in the orchard and loaded by hand onto the harvester.
- In a commercial orchard, a three-hour test was conducted to test harvester field capacity. Every fourth tree was harvested ('Van' pollenizer), 9 row with 21 harvested trees per row. Yield averaged 33 #/tree. Two operators filled 21 bins: equivalent of 56 bins in an 8-hour day (28 bins/worker/8 hour). Time included changing bins, turning at ends of rows, and some delays due to minor repair of impact rubber pads. Harvest capacity would improve if every tree were harvested.
- In 2003 ethrel was effective in reducing fruit detachment force from over 500 gm to the 190-250 gm range.
- Machine harvested fruit quality in 2003 was not as good as in the previous three years. At the Rosa test site, 17 bins of 'Bing' were machine harvested and graded by a commercial packing shed (Western Sweet Cherry Group). Results were 63.8% fresh pack, 12.2% 13 row, 3% brine, 21.6% culls and 2.1 % shrink. In a test in a commercial 'Bing' orchard, 17 bins were machine harvested and graded in the same commercial packing shed. Results were 54.5% fresh pack, 4.9% 13 row, 1.3% brine, 37.7% culls and 1.6 % shrink. Cherries that had been hand harvested from the same orchard, but a week earlier (and probably less susceptible to damage), graded 70.9% fresh pack, 6.2% 13 row, 7.9% brine, 12.6% culls and 2.4 % shrink. Samples of cherries hand harvested on the same day of machine harvest were misplaced.

Methods: We are satisfied with the equipment development phase of this project. New plantings of sweet cherries are being trained to be compatible with this harvesting concept. When these plantings start producing a commercial crop (2005 or 2006), we propose that the harvesting concept be evaluated extensively at that time. We also are ready to work with commercial manufacturers to transfer this technology.

Results and discussion: The mechanical sweet cherry harvester demonstrated that it could improve harvest labor productivity by 14 times. All the key machine components for commercial adoption

have been developed. Fruit quality from machine harvesting was not as good as it was in the previous 3 years of testing. After the harvest season was over, we may have discovered the reason for this reduction in fruit quality. Over the last 2 to 3 years a large number of cherries had worked their way under the inclined catching conveyors and the pits had wedged between the soft foam flights and the cover sheet. These pits presented many hard surfaces to the falling cherries and therefore likely to cause extensive pitting. The conveyors were cleaned before harvesting apples. A method to eliminate the problem was devised.

Budget: No money requested for 2004.