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

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Cooperators: Matthew Whiting, Bob Harris, Dennis Hayden

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.

Significant findings:
- A two-piece experimental harvester was developed. Both units contained a rapid displacement actuator (RDA) to effect fruit removal, an effective system to position the RDA against main scaffolds, soft catching/collecting conveyors, an automated bin filler, and an easily positioned and effective trunk seal that consisted of spring-loaded padded catcher-pans.
- In 2002 ethrel was effective in reducing fruit detachment force from over 500 gm to the 200-300 gm range; fruit removal averaged better than 90%.
- Harvested rates of over 100 tree/hour were obtained with over 2000#/hour of cherries harvested. With properly trained limbs, harvest rate should easily exceed 150 trees/hour.
- The harvester caught 90% of the cherries removed. The spring-loaded padded catcher-pans were very effective in sealing the tree trunk except when limbs were too low or trellis members too wide near the ground. Most fruit lost to the ground was either in front of or behind the catching surfaces. Longer catching surfaces would significantly reduce fruit loss.
- Again in 2003 machine harvested fruit quality compared favorably with hand harvesting. Machine harvested sweet cherries had only 3 % more damage than hand harvested cherries and averaged 61% fresh market quality.

Methods: In 2003 we hope to test the experimental harvester at two locations (Roosevelt, Processor) to continue evaluation of tree training compatibility, ethrel response, fruit quality, harvest rates and capacity, and therefore better represent commercial potential. Methods for improved bin handling will be explored and incorporated into harvester design.

Results and discussion: A complete mechanical harvester has been developed for stemless sweet cherries. In three years of testing, machine harvested cherries had only 1 to 4% more damage than commercial hand harvesting and essentially no significant differences in the amount of fresh market quality fruit. Machine components are reliable. Tree training requirements have been identified that will result in the highest removal, best quality, and most efficient operation of the harvester. Each tree should have 2 to 3 main scaffolds per side with each scaffold angled 45° to 60° to the horizontal. Lateral fruiting branches should be stiff and 2 to 3 feet in length. With the proper training system, this mechanical harvesting concept should be commercially feasible, and lower grower costs and dependence on hand labor.
Budget: 2000-2002
Title: Mechanical Harvester for Fresh Market Quality Stemless Sweet Cherries
PI: Donald L. Peterson
Project duration: 3 years
Project total (3 Years) $85,500

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* Per diem for 2 people for 21 days, car rental, and airfare for 2 people for harvester evaluation.
** Transportation of harvesters from West Virginia to Washington and return. Transportation within Washington.