FINAL REPORT **YEAR: 1 of 1**
WTFRC Project Number: AP-07-708

Project Title: Sprayable 1-MCP for managing apple harvest and postharvest quality

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Total project funding request: **Year 1: $12,000** **Year 2:** **Year 3:**

Other funding Sources: NONE

Budget:

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Item	2007
Salaries	5,220
Benefits	1,780
Wages	3,590
Benefits	410
Equipment	0
Supplies	200
Travel	800
Miscellaneous	0
Total	12,000

Objectives:

1. Evaluate effects of ethephon applied 4 weeks or 4 and 3 weeks before normal harvest on fruit quality attributes at harvest 2 or 1 week(s) before normal harvest and at normal harvest.
2. Examine effects of postharvest SmartFresh treatment with or without early ethephon on storability and fruit quality attributes for each harvest date after short-term RA and medium-term CA storage.
3. Assess whether combinations of ethephon applied 4 or 3 weeks before normal harvest and SmartFresh postharvest can enable earlier than normal harvest of fruit with comparable quality and storage characteristics to untreated fruit harvested at the normal timing.

Significant findings:

1. Two treatments of ethephon at 150 mg a.i./liter at a weekly interval had less effect on stimulating drop than a single treatment with 300 mg a.i./liter.
2. Both ethephon treatments induced significant drop; a stop-drop treatment of NAA should be used if this program is repeated (combining ReTain and ethephon treatment on 'Cripps Pink' apple stimulates, rather than retards, fruit drop).
3. Over a two-week interval (three harvests), ethephon stimulated fruit C_2H_4 production in proportion to treatment concentration, not number of applications.
4. Ethephon significantly increased C_2H_4 production for the first two harvests and enhanced starch hydrolysis on the second harvest date.

Methods:

One trial was established in a cropping 'Cripps Pink' apple orchard in Wapato. Multiple-tree plots were chosen to allow sufficient fruit for sequential harvests over 3 weeks. A randomized complete block experimental design was used, with pre-harvest treatments in a one-way treatment arrangement, subdivided into a 3X2 factorial when harvested fruit samples were separated into replicate non-treated or SmartFresh-treated fruit. Harvest evaluations of fruit characteristics were made, to be followed by subsequent evaluations at 60 days of RA storage, as well as 90 and 120 days of CA storage. Experimental harvest in this trial began 2 weeks before normal commercial harvest, to simulate the avoidance of an early freeze event that otherwise might severely damage a large percentage of the crop.

Results and discussion:

Preharvest ethephon did not result in softer fruit flesh at harvest, a common observation that does not indicate how fruit will behave in storage. Starch hydrolysis and C_2H_4 production were the two fruit characteristics most affected at harvest by preharvest ethephon treatment. The lack of accumulating differences in fruit characteristics at the third harvest suggests that the substantial crop loss to drop may have adjusted the population of remaining fruits such that less mature fruit were the only ones left on ethephon-treated trees at commercial harvest. If so, this observation is not of serious concern, since any program in which ethephon would be used preharvest would also automatically schedule harvest earlier than the normal commercial harvest time in order to retain a larger proportion of the crop in an early fall freeze event. Follow-up evaluations are planned for short-term RA (60 days) and medium-term CA (90 and 120 days).

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Publications 2007:

Elfving, D.C. and D.B. Visser. 2007. Improving the efficacy of cytokinin applications for stimulation of lateral branch development in young sweet cherry trees in the orchard. HortScience 42:251-256.

Elfving, D.C., S.R. Drake, A.N. Reed and D.B. Visser. 2007. Preharvest applications of sprayable 1-methylcyclopropene in the orchard for management of apple harvest and postharvest condition. HortScience 42:1192-1199.

Elfving, D.C. and D.B. Visser. 2007. The use of bioregulators in the production of deciduous fruit trees. Acta Hort. 727:57-66.

Schmidt, T.R. and D.C. Elfving. 2007. Crop load management of apple via induced plant stress. J. Amer. Pom. Soc. 61:167-169 (2nd place U.P. Hedrick award).

Elfving, D.C. and D.B. Visser. 2007. Optimizing vegetative and reproductive growth. Proc. Wash. State Hort. Assn. 102:55-56.

Elfving, D.C. 2007. Bioregulator sprays. p. 74-86. In: T.J. Smith (coord.), 2007 Crop Protection Guide for Tree Fruits in Washington. EB 0419.

Elfving, D.C. and D.B. Visser. 2007. Bioregulator effects on growth, flowering and cropping in apple trees. Poster, Wash. State Hort. Assn. Annual Meeting, Wenatchee, WA.

Elfving, D.C. and D.B. Visser. 2007. Branch induction in pear trees with bioregulators. Poster, Wash. State Hort. Assn. Annual Meeting, Wenatchee, WA.

D.B. Visser and D.C. Elfving. 2007. Bioregulators for managing growth, cropping and fruit quality in sweet cherry. Poster, Wash. State Hort. Assn. Annual Meeting, Wenatchee, WA.

Manuscripts accepted for publication:

Lenahan, O., M. Whiting, and D. Elfving. Gibberellic acid is a potential sweet cherry crop load management tool. Acta Horticulturae.

Schmidt, T.R., D.C. Elfving, et al. GA and fruit maturity. HortTechnology.

Schmidt, T.R. and D.C. Elfving. Crop load management of apple via induced plant stress. J. Amer. Pom. Soc. (2nd place U.P. Hedrick award 2007).