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

PI: Don C. Elfving
Organization: WSU Tree Fruit Research and Extension Center
Telephone: 509-663-8181 x252
Address: 1100 N. Western Avenue
City: Wenatchee
State/Zip: WA 98801
Email: delfving@wsu.edu

Cooperators: Eugene M. Kupferman, Horticulturist, WSU-TFREC; Dwayne Visser, Agric. Technol. III, WSU-TFREC

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

Other funding Sources: NONE

Budget:

<table>
<thead>
<tr>
<th>Item</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries</td>
<td>5,220</td>
</tr>
<tr>
<td>Benefits</td>
<td>1,780</td>
</tr>
<tr>
<td>Wages</td>
<td>3,590</td>
</tr>
<tr>
<td>Benefits</td>
<td>410</td>
</tr>
<tr>
<td>Equipment</td>
<td>0</td>
</tr>
<tr>
<td>Supplies</td>
<td>200</td>
</tr>
<tr>
<td>Travel</td>
<td>800</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>12,000</td>
</tr>
</tbody>
</table>

Organization Name: WSU-Tree Fruit Research and Extension Center
Contract Administrators: Mary Lou Bricker; Kevin J. Larson
Email address: mdesros@wsu.edu; kevin_larson@wsu.edu
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 C2H4 production in proportion to treatment concentration, not number of applications.
4. Ethephon significantly increased C2H2 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 C2H4 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).

Acknowledgments:
The assistance and support of the following persons and organizations are gratefully acknowledged: Lynnell Brandt, Nancy Buchanan, Clyde Buechler, Dr. Steve Drake, Jeff Henry, Dr. Gene Kupferman, Dr. Nate Reed, Chris Sater, Dwayne Visser, Marcia Walters, Mike Young, AgroFresh, Inc., Bayer Crop Science, E.W. Brandt & Sons, Inc., Washington Tree Fruit Research Commission, WSU Agricultural Research Center.
Publications 2007:

Manuscripts accepted for publication: