Carryover Effect of Succinic Acid
2, 2-Dimethylhydradize
on Fruit Shape of ‘Delicious’ Apples

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Abstract. Succinic acid 2,2-dimethylhydradize (Alar) applied commercially to ‘Delicious’ apple trees at a concentration of 1,000 ppm at 8 and 125 days after full bloom in 1968 caused flattened misshapen fruit to be produced in 1969.

Effect of succinic acid 2,2-dimethylhydradize (Alar) on fruit size has been reported (2,4,5), but little mention was made of its effect on fruit shape. Recently Crowe et al. (3,8) and Sullivan (7) observed flattening of apple fruits from summer and fall applications of Alar. Here we report a carryover effect caused by sprays applied during one season on the shape of the apple developed the following season.

To determine the extent of fruit flattening as a result of summer applications of Alar, 20 fruit from representative limbs from each of 10 treated and 10 control trees in 5 different orchards were collected in Washington and the length-to-diameter (L/D) ratios of the fruit were calculated. Samples were taken before harvest from trees sprayed commercially the previous season with 1,000 ppm of Alar at 80 to 85 days after full bloom, and from experimental trees sprayed with 1,000 and 2,000 ppm Alar at 125 days after full bloom.

The average L/D ratios for fruit sprayed 80 to 85 days after full bloom from each orchard are shown in Table 1. It was difficult to casually observe any differences in fruit shape on the trees sprayed at 80 to 85 days after full bloom. However, the L/D ratios indicated significant differences in fruit shape in 5 of the orchards (Table 1). While this was statistically significant, it was not sufficient to reduce the commercial grade of the fruit. Representative apples with a maximum difference in L/D ratio of 0.05 are shown in Fig. 1.

Table 1. Effect of Alar applied 80-85 days after full bloom on shape of ‘Delicious’ fruit.

<table>
<thead>
<tr>
<th>Orchard location</th>
<th>Control L/D ratio</th>
<th>Alar L/D ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor</td>
<td>0.90</td>
<td>0.85*</td>
</tr>
<tr>
<td>Leavenworth</td>
<td>0.89</td>
<td>0.90</td>
</tr>
<tr>
<td>Chelan</td>
<td>0.94</td>
<td>0.92</td>
</tr>
<tr>
<td>Tonasket</td>
<td>0.90</td>
<td>0.85*</td>
</tr>
<tr>
<td>Lamberton</td>
<td>0.91</td>
<td>0.87*</td>
</tr>
<tr>
<td>Yakima</td>
<td>0.95</td>
<td>0.91*</td>
</tr>
<tr>
<td>Wenatchee</td>
<td>0.97</td>
<td>0.92*</td>
</tr>
<tr>
<td>Average</td>
<td>0.92</td>
<td>0.89</td>
</tr>
</tbody>
</table>

*Significantly different at 5% level (LSD = 0.021).

Effect of Alar, the timing and concn of sprays used on ‘Delicious’ and other cultivars are very important. Tests conducted in Washington indicate that a spring application of Alar at a concn of 500 ppm is almost as effective as a summer application of 1,000 ppm (1). In some instances the 500 ppm rate has not given consistent results, and higher rates applied in the spring cause too much reduction in fruit size (1). For this reason Alar has been applied to bearing ‘Delicious’ at 70 to 80 days after full bloom at a concn of 1,000 ppm. We have not observed carryover effects of any commercial importance from the 70-day applications. However, with repeated use of the chemical, carryover, resulting in adverse fruit shape, may occur and earlier summer applications at a lower concn may be necessary.

Literature Cited

Fig. 1. ‘Delicious’ fruit, right and center, with length-to-diameter ratios indicated are from trees sprayed the previous season at 85 days from full bloom with 1,000 ppm of Alar.

Fig. 2. ‘Delicious’ fruit with length-to-diameter ratios indicated are from trees sprayed with Alar the previous season at 125 days after full bloom. These fruit represent the average L/D ratio of 100 fruit from each treatment.

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5 Succinic acid 2,2-dimethylhydradize was used as Alar-85, manufactured by Uniroyal Chemical, Division of Uniroyal, Inc., Naugatuck, Connecticut 06770. Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture, and does not imply its approval to the exclusion of other products that may also be suitable.