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STOP-DROP SPRAYS FOR JONATHAN AND DELICIOUS APPLES

STOP-DROP sprays prevent excessive pre-harvest drop of Jonathan and Delicious apples. Recent research has thrown more light on the best methods of employing these materials.

By N. H. SHORTER, Horticultural Adviser, and J. CRIPPS, Research Officer, Plant Research Division

TWO CHEMICALS used as "stop-drop" sprays are available commercially in Western Australia. One of these, alpha naphthalene acetic acid (NAA), is also well known as a thinning spray for apples.

The other material, 2, 4, 5 trichlorophenoxy-propionic acid (245 TP), although also a hormone, is a distinctly different chemical and one which can not be used as a thinning spray.

NAA is sold under the trade names of PHYOMONE, SHELESTONE and LANES NAA.

245 TP is sold as STAYPUT A and PROMONE.

Either material will effectively reduce pre-harvest drop. There are however, important differences in the results that can be obtained.

NAA lacks some of the advantages of 245 TP for certain situations. For instance, two applications are usually required.

245 TP is effective over a longer period than is NAA. Furthermore, its application at 10 parts per million (ppm) results in a greater reduction in pre-harvest drop than does the application of NAA at the same concentration. Because of its long lasting effect, one spray of 245 TP is usually sufficient.

When applied at twice the normal concentration 245 TP is likely to advance fruit maturity slightly and also increase fruit colour, which is an asset when fruit is to be placed on the local market early in the season. An improvement in red colour has been observed more positively on Jonathans that on Delicious.

On the other hand, the use of 245 TP at the higher strength often leads to an increase in the break-down of fruit after removal from cold storage. At this strength, therefore, 245 TP should not be applied to fruit which is to be cold stored or exported.

Both NAA and 245 TP have a place as stop-drop sprays. The final choice will depend on the purpose for which the fruit is being picked. Further details are given in the Table of recommendations.

Timing of sprays

It is much better to apply sprays earlier than to wait until a noticeable drop occurs.

If NAA is used, a first spray should be applied about one month before harvesting is normally due. The first spray should be followed by a second spray a fortnight later. The second spray is most important if picking is likely to be delayed.

With 245 TP, the spray is best applied a month before the first picking date is due. A second spray is not usually required.
## Recommendations for Control of Pre-Harvest Drop of Jonathan and Delicious Apples

<table>
<thead>
<tr>
<th>Variety</th>
<th>Material</th>
<th>Trade Preparations</th>
<th>Quantity per 100 gallons of spray</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jonathans for cool storage or export</td>
<td>NAA, 10 ppm</td>
<td>Phyomone</td>
<td>8 oz.</td>
<td>Two thorough sprays at fortnightly intervals, first 3 to 4 weeks before first pick. Use with spreader.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shellestone</td>
<td>8 oz.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lanes NAA</td>
<td>4 oz.</td>
<td></td>
</tr>
<tr>
<td>Delicious for cool storage, and</td>
<td>245 TP, 10 ppm</td>
<td>Stayput A</td>
<td>2 oz.</td>
<td>One thorough spray 3 to 4 weeks before first pick. Use with spreader.</td>
</tr>
<tr>
<td>Jonathans for local market later in the season</td>
<td>or</td>
<td>Promone</td>
<td>2 oz.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NAA, 10 ppm</td>
<td>Phyomone</td>
<td>8 oz.</td>
<td>Two thorough sprays at fortnightly intervals, first 3 to 4 weeks before first pick. Use with spreader.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shellestone</td>
<td>8 oz.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lanes NAA</td>
<td>4 oz.</td>
<td></td>
</tr>
<tr>
<td>Jonathans for local market early in season</td>
<td>245 TP, 20 ppm</td>
<td>Stayput A</td>
<td>4 oz.</td>
<td>One thorough spray 3 to 4 weeks before first pick. Not for fruit to be cool stored or exported or allowed to fully mature on the tree. Use with spreader.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Promone</td>
<td>4 oz.</td>
<td></td>
</tr>
</tbody>
</table>
Picking dates

While pre-harvest sprays will reduce drop most effectively, they may not eliminate it completely. As much as 20 per cent. of the fruit can still fall if seasonal conditions are unfavourable. It is, therefore, an advantage to harvest part of the crop reasonably early to reduce wastage.

Non-irrigated trees have been found to be more susceptible to drop than irrigated trees.

Spraying methods

Sprays should be thoroughly applied; this entails a complete cover of the trees to the point of run-off.

The use of a “spreader” is an advantage. Both NAA and 245 TP are normally used at a strength of 10 ppm. The quantity of chemical required for a given volume of spray will vary with the brand.

With NAA a strength of 10 ppm is obtained by adding one 8 oz. bottle of Phyomone or one 4 oz. bottle of Lanes NAA to 100 gallons of water.

A strength of 10 ppm of 245 TP is obtained by adding one 2 oz. bottle of Stayput A or Promone to 100 gallons of water.

Where 245 TP is used at twice normal strength, 4 oz. of Stayput A or Promone are added to 100 gallons of water.

RESULTS OF RECENT TRIALS WITH STOP-DROP SPRAYS FOR DELICIOUS APPLES

During the 1962-63 fruit season, a trial was started in a Donnybrook orchard to obtain more information on the advantages or disadvantages of using one spray of 245 TP (at a strength of 10 ppm) as compared with one or two sprays of NAA (also at 10 ppm) as a stop-drop spray for the Delicious variety.

Information was sought on the relative effectiveness of each spray in reducing pre-harvest drop, and on the possible differences in the quality of the apples after a five-month period in cool storage.

The treatments compared in this trial were—

- NAA at 10 ppm with the addition of wetting agent; trees sprayed in early February, one spray only.
- NAA at 10 ppm with the addition of wetting agent; trees sprayed in early February and again in mid to late February.
- 245 TP at 10 ppm with the addition of wetting agent; trees sprayed in early February, one spray only.
- Unsprayed.

The block of trees selected for the trial consisted of non-irrigated Delicious, all more than 25 years old and all carrying an average crop of well sized fruit.

The trial was randomised with six replications of the four selected treatments.

Counts of fruit drop were made on three occasions during the late February-mid March period.

Sample cases of fruit were harvested from the trees of each treatment and placed in cool storage for a later assessment of keeping quality. The fruit remained in cool storage from late March to early September.

The trial was repeated in an irrigated orchard at Newlands in the 1964 season and again in a non-irrigated orchard in Donnybrook in 1965, using the same block of trees as in 1963.

Results

In the trial conducted in 1963, one spray of 245 TP proved to be at least as effective as two sprays of NAA in reducing fruit drop.
drop. One spray of NAA was found to be no better than no spray at all. The effectiveness of each treatment in reducing fruit drop is shown in the table below.

This trial also clearly showed that up to the end of the cool storage period, differences in maturity and keeping quality of fruit sampled from the various treatments were negligible and of no practical significance. Fruit from all three spray treatments appeared to have matured at a slightly faster rate in storage than the fruit from the unsprayed trees.

Similar results were obtained in trials conducted during the 1964 and 1965 seasons.

Conclusions
Trials conducted over three fruit seasons have shown that a single spray of 245 TP applied in early February at a strength of 10 ppm is an effective stop-drop spray for the Delicious variety, comparing very favourably with two sprays of NAA.

A single application of NAA at a strength of 10 ppm was found to be ineffective for reducing pre-harvest drop. Over a three-year period, it has also been shown that where 245 TP at a strength of 10 ppm has been substituted for one and/or two sprays of NAA at the same strength, the keeping quality of Delicious apples has not been adversely affected after a five-month period in cool storage.

In view of these results, 245 TP at a strength of 10 ppm can now be recommended as a safe and effective spray for Delicious variety; this recommendation applies to apples to be placed in cool storage as well as those to be sold directly on the local market.

The use of 245 TP at twice normal strength has not been fully assessed for Delicious and therefore cannot be recommended for this variety.

ACKNOWLEDGMENTS
Grateful appreciation is expressed for the assistance given by the growers Mrs S. Cusato and Sons of Donnybrook, and Messrs. A. Licciadello and Sons of Newlands in making their orchards available for the trials.

Comparison of stop-drop sprays for Delicious apples—Donnybrook, 1962-63

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>NUMBER OF APPLES FALLEN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Feb. 20 (Total 6 trees)</td>
</tr>
<tr>
<td>NAA, 10 ppm + wetting agent early February</td>
<td>25</td>
</tr>
<tr>
<td>NAA, 10 ppm + wetting agent early February and again in mid to late March</td>
<td>13</td>
</tr>
<tr>
<td>245 TP, 10 ppm + wetting agent early February</td>
<td>18</td>
</tr>
<tr>
<td>Unsprayed</td>
<td>....</td>
</tr>
</tbody>
</table>
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