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Bactericidal sprays for tomato bacterial canker

O M. Goss

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Bactericidal Sprays for Tomato Bacterial Canker

Bactericidal sprays applied immediately after pruning or after severe storms should reduce the spread of tomato bacterial canker—report of an experiment by...


BACTERIAL CANKER of tomatoes causes its greatest damage in crops grown in the spring and autumn months in Western Australia. It is particularly damaging when the weather is unusually stormy and cool.

The disease, caused by the bacterial parasite Corynebacterium michiganense, is usually introduced by means of infected seed or seedlings. It can also persist from season to season in contaminated soil or supporting stakes. Once established in a crop it can spread rapidly from plant to plant, particularly during pruning.

Nearly all West Australian growers prune and stake their tomatoes. The result is that once initial centres of the disease are established, either from original seed infection or contaminated soil, bacterial canker can be rapidly spread through a whole planting.

Although the standard hot water seed treatment is widely used, infection centres still occur, and it is important to limit the spread from these.

As most of the actual spread seems to be related to pruning, a number of bactericides, including antibiotics, were tested as cover sprays applied immediately after pruning.

Fruit showing "bird's eye" spotting due to external infections with the canker organism. Left: Badly infected fruit. Note white haloes and dark centres of the spots
Right: Early stage of the spot
THE EXPERIMENT
The trial was conducted at the Vegetable Research Station, Wembley, using tomatoes transplanted at the end of March, 1962.

The experimental design was a simple randomised block containing five replications of six treatments. Each plot was two rows of 10 plants.

The bactericides tested as cover sprays were—

CETRIMIDE—2 grams in 2½ gallons of water.

STREPTOMYCIN—1 gram in 2½ gallons of water plus 114 mils of glycerine.

AGRIMYCIN—1½ tablespoons in 2½ gallons of water.

*VANCOMYCIN—1 gram in 2½ gallons of water.

The other treatments included were Cetrime disinfection of the pruning knife (the standard recommendation) and an untreated control.

The first two plants of the first row of each plot were inoculated with Corynebacterium michiganense to ensure an even distribution of the disease in all plots.

At each pruning time the following procedure was adopted for each treatment: The two inoculated plants were pruned, followed by the other eight plants of the first row of each replicate. Pruning tools were then sterilised with alcohol and the 10 plants in the second row of each treatment plot pruned. The spray was then applied. This pruning procedure allowed some separation of spread from the inoculated diseased plants during pruning, and natural spread by such agencies as wind, water splash, insects, and so on.

Inoculation was done on April 17 and the first pruning and spraying on April 30 and May 1, 1962. Subsequent treatments were at fortnightly intervals for four sprays, then two further sprays were given three weeks apart. Final readings of infection were taken on August 1, 1962.

* Supplied by courtesy of Eli-Lilly Laboratories, Indianapolis, U.S.A.

RESULTS
The final analysis of infection in relation to treatment is contained in Tables 1 and 2. Table 1 gives the figures for the complete experiment and Table 2 for the...
half plots where no artificial inoculation was done but where natural spread occurred.

All the sprays used gave some control of the disease before the storm in early July. After the storm, spread was more rapid and differences in effectiveness became more obvious.

Table 1 (where the whole experiment is considered) shows that Vancomycin, Cetrimide and Streptomycin gave significantly better control than Cetrimide disinfection of the pruning knife. Agrimycin was no better than the control.

Where no artificial inoculation was done (Table 2) the same three chemicals were again significantly better than other treatments but in this case no other treatment was better than the control. There was no significant difference between these three chemicals.

Before the storm damage, pruning was the main means of spread (shown by comparing the first columns of Tables 1 and 2). The more rapid spread in inoculated rows resulted in severe stunting of growth when the plants were infected early.

**PRACTICAL INDICATIONS**

The results of this experiment indicate that in a commercial planting (where the initial infection rate would usually be much lower) a fair degree of control could be expected from spraying with one of the more promising materials—Vancomycin, Cetrimide or Streptomycin—particularly following the first two or three prunings.

The increased rate of spread after the storm indicates that in a crop where some canker is present a further spray following a storm would be desirable.

Further trials with these chemicals are planned. In the meantime, as Cetrimide is the only one of the promising materials available, it is suggested that growers may care to test this material in their autumn crops.

The recommended dosage rate is 3 oz. in 100 gallons. Burning may occur if higher rates are used.

**ACKNOWLEDGMENT**

The author wishes to thank Mr. W. Pickering (Field Technician) for the assistance given with the field work of pruning and spraying.

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**TABLE 1**

Control of tomato bacterial canker by bactericidal sprays applied after pruning. Analysis of results of whole experiment including rows artificially inoculated.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Per cent. Infected Plants on</th>
<th>Mean Arc Sin % Transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>June 26 (before storm)</td>
<td>August 1</td>
</tr>
<tr>
<td>Control (Untreated)</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Cetrimide Spray (2 grams in 2½ gallons of water)</td>
<td>17</td>
<td>56</td>
</tr>
<tr>
<td>Streptomycin (1 gram in 2½ gallons of water + 114 mils of glycerine)</td>
<td>19</td>
<td>61</td>
</tr>
<tr>
<td>Agrimycin (1½ tablespoons in 2¼ gallons of water)</td>
<td>22</td>
<td>85</td>
</tr>
<tr>
<td>Vancomycin (1 gram in 2½ gallons of water)</td>
<td>13</td>
<td>48</td>
</tr>
<tr>
<td>Cetrimide Disinfection of the Pruning Knife</td>
<td>26</td>
<td>73</td>
</tr>
<tr>
<td>L.S.D. 5% Level</td>
<td>15-55</td>
<td>1-56</td>
</tr>
<tr>
<td>1% Level</td>
<td>20-56</td>
<td>2-56</td>
</tr>
<tr>
<td>0-1% Level</td>
<td>28-28</td>
<td>2-29</td>
</tr>
</tbody>
</table>

**TABLE 2**

Control of bacterial canker of tomatoes by bactericidal sprays applied after pruning. Analysis of results in rows where no artificial inoculation was done.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Per cent. Infected Plants on</th>
<th>Mean Arc Sin % Transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>June 26 (before storm)</td>
<td>August 1</td>
</tr>
<tr>
<td>Control (Untreated)</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Cetrimide Spray (2 grams in 2½ gallons of water)</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>Streptomycin (1 gram in 2½ gallons of water + 114 mils of glycerine)</td>
<td>10</td>
<td>46</td>
</tr>
<tr>
<td>Agrimycin (1½ tablespoons in 2¼ gallons of water)</td>
<td>10</td>
<td>80</td>
</tr>
<tr>
<td>Vancomycin (1 gram in 2½ gallons of water)</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>Cetrimide Disinfection of the Pruning Knife</td>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>L.S.D. 5% Level</td>
<td>21-73</td>
<td>1-56</td>
</tr>
<tr>
<td>1% Level</td>
<td>29-53</td>
<td>2-56</td>
</tr>
<tr>
<td>0-1% Level</td>
<td>40-03</td>
<td>2-29</td>
</tr>
</tbody>
</table>
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PROGRESS IN T.B. TESTING
Nearly all butterfat dairy herds in Western Australia have now been tested for tuberculosis. This has taken little over a year of intensive testing under the Dairy Cattle Industry Compensation Act.

During this initial series of tuberculin testing of butterfat herds about 95,000 cattle in 1937 herds were tested by Department of Agriculture and private veterinary surgeons.

The incidence was remarkably low. There were only 840 reactors—0.856 per cent. of the total population. One reason for this was that, with the co-operation of the farmers concerned some badly affected herds were cleaned up before the main testing started.

In the last two months of testing 5,293 cattle were tested in 138 herds. There were 62 reactors—an incidence of 1.17 per cent.

Now that most butterfat herds have been tested the intention is to re-test all herds biennially.

This is already done with wholemilk herds under the Milk Act, where the Department of Agriculture's work has reduced tuberculosis to a low level. In the last two months of testing whole milk cattle, 2,083 cattle were tested in 22 herds and 13 reactors (0.62 per cent.) were found. Thirteen of the 22 herds tested contained no reactors.