Cover spraying for the control of celery leaf spot.
Part 2

S C. Chambers

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COVER SPRAYING FOR THE CONTROL OF CELERY LEAF SPOT – II
By S. C. CHAMBERS, M.Sc., Plant Pathologist

Several additional cover spray schedules for the control of leaf spot in winter celery, have been evaluated during the past two years. The most satisfactory of these is one in which Bordeaux 4 : 4 : 40 is replaced by Ziram for the last two applications before harvest.

Celery Leaf Spot, caused by the fungus *Septoria apii* Chester, has been a serious problem (affecting both yield and quality) in winter grown celery for many years. Although it can be controlled with Bordeaux 4 : 4 : 40 (Chambers, 1958), this fungicidal material discolors the foliage of celery and thus detracts from the market value of the produce.

In an endeavour to overcome this problem, further field experiments have been conducted, using schedules in which Bordeaux was replaced by non-discoloring sprays as the crop approached maturity. In the same trials, the efficacy of several other copper fungicides was compared with that of Bordeaux mixture.

**Experimental**

The field work was carried out on the property of Mr. W. Stevens, Balcatta during the winters of 1959 and 1960. In each season, portion of the celery crop was divided into a randomised plot system and the selected fungicidal treatments were applied to the appropriate plots.

The incidence of Leaf Spot in relation to treatment was assessed just before harvesting. In order to do this, randomised samples of 100 leaves from each plot were examined, and a numerical value was allotted to the condition of each leaf in accordance with Table 1.

The mean value obtained for each plot was transformed to an $\sqrt{x}$ value during the analysis of results.

**1959 Season**

This trial consisted of a simple randomised system of plots, each measuring 21 links in length by 2 rows in width. It was designed to incorporate 5 replications of the following eight simple and split schedules:

**Simple Schedules** (fungicide applied at intervals of 10 days)—

2. Colloidal Copper $2\frac{1}{2}$ pints/100 gal.
3. Copper oxychloride 4 lb./100 gal.
4. Copper zinc chromate 2 lb./100 gal.

**Split Schedules** (fungicide applied at intervals of 10 days)—

Each of these 4 schedules was commenced with Bordeaux 4 : 4 : 40.

For the last 3 applications before harvest, this was replaced by one of the following:

5. Ziram $1\frac{1}{2}$ lb./100 gal.
6. Colloidal Copper $2\frac{1}{2}$ pints/100 gal.
7. Copper oxychloride 4 lb./100 gal.
8. Copper zinc chromate 2 lb./100 gal.

Spraying was begun on April 20, 1959, and continued until August 3, 1960. The incidence of leaf spot in relation to treatment was assessed on August 10, 1960, and an analysis of these results is contained in Table 2.
Table 2
EFFECT OF VARIOUS SCHEDULES ON THE INCIDENCE OF LEAF SPOT IN 1959

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Evaluation of disease incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean leaf value</td>
</tr>
<tr>
<td>Bordeaux followed by Ziram</td>
<td>0.29</td>
</tr>
<tr>
<td>Bordeaux followed by Copper oxychloride</td>
<td>0.42</td>
</tr>
<tr>
<td>Bordeaux</td>
<td>0.43</td>
</tr>
<tr>
<td>Bordeaux followed by Colloidal copper</td>
<td>0.48</td>
</tr>
<tr>
<td>Bordeaux followed by Copper zinc chromate</td>
<td>0.49</td>
</tr>
<tr>
<td>Copper oxychloride</td>
<td>0.69</td>
</tr>
<tr>
<td>Colloidal copper</td>
<td>1.45</td>
</tr>
<tr>
<td>Copper zinc chromate</td>
<td>2.23</td>
</tr>
<tr>
<td>Difference for significance P = 0.05</td>
<td></td>
</tr>
</tbody>
</table>

1960 SEASON

In view of the previous year's results, it was decided to eliminate those schedules involving the inferior sprays of colloidal copper and copper zinc chromate. In addition, the time interval between applications was increased from 10 days, to 14 days, so as to accentuate any differences between the relative efficacy of the remaining fungicides. Consequently the trial was restricted to the following four modified simple and split schedules.

Simple Schedules (fungicide applied at intervals of 14 days)—
(1) Bordeaux 4 : 4 : 40.
(2) Copper oxychloride 4 lb./100 gal.

Split Schedules (fungicide applied at intervals of 14 days)—
Each of these 2 schedules was commenced with Bordeaux 4 : 4 : 40.

For the last 2 applications before harvest, this was replaced by one of the following:
(3) Ziram 1\(\frac{1}{2}\) lb./gal.
(4) Copper oxychloride 4 lb./100 gal.

The experimental plot design was in the form of 2 adjacent latin squares and contained 8 replications of the 4 treatments. Each of the 32 component plots measured 25 links in length by 2 rows in width.

Spraying was commenced on May 2, 1960, and continued until September 5, 1960. The incidence of leaf spot was assessed on September 14, 1960, and an analysis of results is contained in Table 3.

Table 3
EFFECT OF VARIOUS SCHEDULES ON THE INCIDENCE OF LEAF SPOT IN 1960

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Evaluation of Leaf Spot Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean leaf value</td>
</tr>
<tr>
<td>Bordeaux</td>
<td>0.63</td>
</tr>
<tr>
<td>Bordeaux followed by Ziram</td>
<td>0.74</td>
</tr>
<tr>
<td>Bordeaux followed by Copper oxychloride</td>
<td>0.90</td>
</tr>
<tr>
<td>Copper oxychloride</td>
<td>1.72</td>
</tr>
<tr>
<td>Difference for significance P = 0.05</td>
<td></td>
</tr>
</tbody>
</table>

From these results it is evident that the most satisfactory of the four schedules was the one in which Ziram replaced Bordeaux for the last two applications. It was significantly better than those containing copper oxychloride, and it also largely overcame the discoloration problem of Bordeaux, without increasing the incidence of Septoria Leaf Spot.

RECOMMENDATION

Septoria leaf spot can be effectively controlled in winter grown celery by spraying with Bordeaux 4 : 4 : 40. The first application should be made a week after transplanting and subsequent sprays should be applied regularly, at intervals not exceeding 14 days. To overcome the discoloration problem of Bordeaux, this fungicide should be replaced by Ziram (1\(\frac{1}{4}\) lb./100 gal.) for the last 2 applications before harvest.

ACKNOWLEDGMENTS

The author is indebted to Mr. W. Stevens, Balcatta, on whose property the trial was conducted. Thanks are due also to Mr. W. Pickering for his assistance with the field work.

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