Bare patch and poor emergence of cereals: factors under investigation. 1. Seed treatment and moisture content

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Bare Patch and Poor Emergence of Cereals

FACTORS UNDER INVESTIGATION

1.—Seed Treatment and Moisture Content

By S. C. CHAMBERS, M.Sc., Plant Pathologist

UNDER the relatively dry climatic conditions of Western Australia, over-dosages of organic mercury dusts had no apparent ill-effects upon wheat emergence, irrespective of the initial moisture content of the seed. However, seedling counts were significantly less, with seed of a high moisture content.

An emergence problem known locally as "Bare Patch" has become increasingly prevalent in cereal crops during recent years. Although pathogenic fungi are often responsible for the condition, current investigations have shown that it may also be caused by several other factors.

In some instances involving pathogenic fungi, Cass Smith\(^1\) reported better establishment of wheat seedlings following the use of an organic mercury seed dust. As the same compound also gives effective control of covered smut,\(^1\) dusting seed with an organic mercury fungicide is now the general Departmental recommendation.

Usually the grain is pickled in the field during December or January by contractors at the rate of 1.2 oz./bushel, and then is stored until sown in the following autumn.

In 1959, a report was received from a grower complaining of poor emergence which he attributed to an overdosage of an organic mercury seed dust. As detrimental effects on germination by overdosages have been reported from New Zealand\(^1\) and Germany,\(^3\) it was decided to determine experimentally the effects of high dosages under W.A. conditions.

Experimental:

In February 1960, grain samples were obtained of the following two wheat varieties:

1. The hard grained "Gabo" with a natural moisture content of 9.1 per cent.
2. The soft grained "Insignia 49" with a natural moisture content of 10.7 per cent.

As overseas reports suggest grain with a high moisture content is more liable to fungicidal injury, the moisture content of half of each sample was increased to 16 per cent.

One hundred gram aliquots of grain were then dusted with various dosages of ceresan to give the 32 treatments listed in Table 1. A mixture of ceresan and fernasan (TMTD) was also included because of its current recommendation in New Zealand.\(^3\)
After dusting, no attempt was made to maintain the moisture levels of the samples which were stored in large jars for 16 weeks. The seed was sown during the last week of May in the coarse sandy type of soil, which is so characteristic of the Perth environs.

The experimental design for the test plots was a simple randomised system containing 10 replications of the 32 treatments. Each component plot contained 100 seeds planted at a depth of 1 inch in 10 rows of 10, with a space interval of 1 inch between each seed.

Emergence counts were taken four weeks after sowing and analyses of these results are contained in Tables 2 and 3. Seedlings were apparently normal and there was no evidence of any seedlings being adversely affected by the fungicidal materials.

**DISCUSSION**

It is evident from the results (Table 2) that overdosages of ceresan have not significantly affected the emergence of either the hard grained "Gabo" or the soft grained "Insignia 49."

Reports from Smith and Blair (New Zealand) and Frohberger (Germany) link the deleterious effects of organic mercury dusts with a high moisture content of the grain. However, the moisture content of wheat seed is higher in these countries than here. For example, these workers in New Zealand and Germany used grain with a natural moisture content of 13.7 per cent and 16.8 per cent, respectively, whereas in Western Australia the value is normally 9 or 10 per cent.

From the results (Table 2) it is also apparent that increasing the moisture content to 16 per cent has not sensitised the grain to ceresan injury. However, as no attempt was made to maintain the initially high level, it is believed the hot dry weather of February quickly reduced it again.

In the opinion of Smith and Blair, a high moisture content at harvest and during storage is sufficient in itself, to

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**TABLE 1**

*Seed Treatments Evaluated in Experimental Plots at South Perth*

<table>
<thead>
<tr>
<th>Details of Grain</th>
<th>Dosages of Seed Dressing (oz./bushel) with Ceresan only</th>
<th>Ceresan + Fernasan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety Type</td>
<td>Initial moisture content</td>
<td>0 1 1½ 2 3 4 5 1 + 1</td>
</tr>
<tr>
<td>Gabo Hard</td>
<td>%</td>
<td>9-1</td>
</tr>
<tr>
<td>Gabo Soft</td>
<td>16-0</td>
<td>9 10 11 12 13</td>
</tr>
<tr>
<td>Insignia 49 Soft</td>
<td>16-0</td>
<td>25 26 27 28 29</td>
</tr>
</tbody>
</table>

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**TABLE 2**

*Emergence Counts of Wheat Seedlings in relation to Seed Treatment (a) Variety Gabo*

<table>
<thead>
<tr>
<th>Dosage of Ceresan</th>
<th>Percentage emergence of wheat with an initial moisture content of</th>
<th>Data transformed (Arcsin V per cent. emergence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>oz./bushel</td>
<td>9-1% 16-0%</td>
<td>M.C. 9-1% M.C. 16-0%</td>
</tr>
<tr>
<td>0</td>
<td>% 90-5 87-7</td>
<td>% 72-2 % 69-4</td>
</tr>
<tr>
<td>1</td>
<td>93-5 90-1</td>
<td>75-2 71-7</td>
</tr>
<tr>
<td>1½</td>
<td>95-4 91-3</td>
<td>75-1 72-8</td>
</tr>
<tr>
<td>2</td>
<td>92-3 90-4</td>
<td>73-9 71-9</td>
</tr>
<tr>
<td>3</td>
<td>98-1 89-3</td>
<td>74-8 70-9</td>
</tr>
<tr>
<td>4</td>
<td>94-9 90-5</td>
<td>76-9 72-1</td>
</tr>
<tr>
<td>5</td>
<td>95-7 89-2</td>
<td>75-4 70-8</td>
</tr>
<tr>
<td>1 + 1 oz. Fernasan</td>
<td>91-6 90-5</td>
<td>73-2 72-0</td>
</tr>
</tbody>
</table>

Difference for significance P = 0-05 3-3 3-3