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Bare patch and poor emergence of cereals. 4. Quality of the seed

S C. Chambers

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Bare Patch and Poor Emergence of Cereals

— Factors Under Investigation

4. QUALITY OF THE SEED

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

The importance of using fresh good quality grain for sowing wheat crops was emphasised by results obtained in recent plot trials. Seedling emergence was less for broken, pinched and small types of seed than for large grain and was further reduced with ageing of the seed.

Numerous reports of poor emergence of cereals have been received during the past few seasons, particularly from the Moora, Narrogin and Northam districts. Although parasitic fungi are sometimes responsible, investigations have shown deep sowing to be one of the main causes of the problem. Another important factor has been the crusting of the surface soil, especially in heavier soils.

There has in a few instances been indirect evidence that the sowing of poor quality seed may have contributed to the poor emergence of crops. As there was little local data concerning the emergence of wheat in relation to seed quality, work was undertaken to assess this factor.

EXPERIMENT

A sample of wheat seed (variety Gabo) from the 1960-61 crop at Merredin Research Station was separated into four grain types; they were large, small, pinched and broken (Fig. 1).

On September 7, 1961, seed of the four types was hand-sown one inch deep in small plots at South Perth. The soil in the experimental area was a coarse sand typical of the Swan coastal plain.

The experimental design was a simple randomized plot system which included five replications of the four types of seed. Each individual plot contained 50 seeds sown in five rows of 10 with 2 inches between each seed.

At the same time a germination test was carried out in the laboratory by placing seeds on moist filter paper in petri dishes and incubating at 20° C for six days. Again the experimental design was a simple randomized system but contained 10 replications of the four seed types with 10 seeds in each petri dish.

The experiment was repeated using the same seed sample on June 5, 1962 (nine months later). This differed from the earlier experiment in that the number of seeds in each field plot was increased to 100 and the replications to 10.
RESULTS

Counts were taken of seeds which had germinated in the laboratory after six days (Table 1) and seedlings which had emerged in the plots after 35 days (Table 2.)

### TABLE 1

<table>
<thead>
<tr>
<th>Type of Seed</th>
<th>Percentage Germination for Seed Aged</th>
<th>Transformed Values for Seed Aged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 months</td>
<td>18 months</td>
</tr>
<tr>
<td>Large</td>
<td>95</td>
<td>98</td>
</tr>
<tr>
<td>Pinched</td>
<td>99</td>
<td>94</td>
</tr>
<tr>
<td>Small</td>
<td>91</td>
<td>80</td>
</tr>
<tr>
<td>Broken</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Difference for significance</td>
<td>P = 0.05 ...</td>
<td>P = 0.01 ...</td>
</tr>
</tbody>
</table>

(Counts analysed using the transformation arc sin $\sqrt{\%}$.)

### TABLE 2

<table>
<thead>
<tr>
<th>Type of Seed</th>
<th>Percentage Emergence for Seed Aged</th>
<th>Transformed Values for Seed Aged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 months</td>
<td>18 months</td>
</tr>
<tr>
<td>Large</td>
<td>85.6</td>
<td>77.4</td>
</tr>
<tr>
<td>Pinched</td>
<td>73.2</td>
<td>67.4</td>
</tr>
<tr>
<td>Small</td>
<td>71.6</td>
<td>60.8</td>
</tr>
<tr>
<td>Broken</td>
<td>3.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Difference for significance</td>
<td>P = 0.05 ...</td>
<td>P = 0.01 ...</td>
</tr>
</tbody>
</table>

### DISCUSSION

From the results in Table 1 it is evident that there was no significant difference between the germination of pinched (99 per cent.), small (91 per cent.) and large grain (95 per cent.), nine months after harvest. However, despite these similar germination values, the emergence of seedlings was considerably less for pinched and small seeds than for large grain (73
per cent. and 72 per cent. compared with 86 per cent.—Table 2.)

The emergence of a seedling depends largely on having enough food reserve in the seed for it to grow up through the soil barrier to the surface. The higher percentage emergence of large grain indicates a greater food reserve in this type of seed than in small and pinched grain.

In this experiment, the grain was sown one inch deep as deep sowing had previously been shown to reduce emergence (Chambers 1961). Deeper sowing would therefore have caused a further reduction in emergence, which in all probability, would have been greatest in seed with low food reserves.

Germination and seedling emergence were extremely low in broken seed (Tables 1 and 2). This was probably due to injuries to the wheat germs (embryoes), of this seed.

The effects of ageing on germination and seedling emergence are also shown in Tables 1 and 2. There was no difference between germination of large seed nine and 18 months after harvest. However, the emergence of seedlings using such grain tended to decrease with time, suggesting a gradual depletion of energy reserves in the seed. With small, pinched and broken grain, both germination and emergence values tended to decrease with age.

The age factor would not apply to most crops as they are usually sown with seed from the previous season. However, occasionally when there is an excess demand for a particular variety, old grain is sometimes used as seed. Under these circumstances, the emergence would probably be below average.

RECOMMENDATIONS

In view of the overall results, it is recommended that only the best quality plump grain be used for seeding.

Care should also be taken to ensure that the seed is sown at a depth of 1 to 1½ inches. Deeper sowing will reduce emergence.

REFERENCES


ACKNOWLEDGMENTS

Grateful acknowledgment is made to Mr. L. Price for assistance with the field work and to Miss. P. Thomson for the statistical analysis of results.

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<tr>
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<th>Steel Floor</th>
<th>Steel Earth Ring</th>
<th>Optional Extra</th>
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<tr>
<td>200 (Corr.) Bushels</td>
<td>£59</td>
<td>£7 0 0</td>
<td>—</td>
</tr>
<tr>
<td>250 Elev. (Corr.)</td>
<td>£57</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>500 New Type</td>
<td>£73</td>
<td>£11 10 0</td>
<td>—</td>
</tr>
<tr>
<td>1,200 New Type</td>
<td>£172</td>
<td>£21 0 0</td>
<td>£31</td>
</tr>
<tr>
<td>2,000 New Type</td>
<td>£140</td>
<td>£22 0 0</td>
<td>£31</td>
</tr>
<tr>
<td>3,100 New Type</td>
<td>£313</td>
<td>£31 10 0</td>
<td>£47</td>
</tr>
<tr>
<td>3,700 New Type</td>
<td>£347</td>
<td>£31 10 0</td>
<td>£47</td>
</tr>
</tbody>
</table>

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