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THE EFFECT OF STRAW ON THE EMERGENCE OF WHEAT SEEDLINGS

By W. A. SHIPTON and W. R. TWEEDIE, Plant Pathologists

The emergence of wheat seedlings was decreased substantially when seed was planted close to oaten straw. When the grain was placed a ¼ inch above a straw layer emergence was depressed by more than half.

POOR EMERGENCE of cereals is a problem that has increased in recent years. Investigations by the Department of Agriculture have shown that several factors may be involved.

Chambers (1961, 1962, 1963) found that planting the seed too deeply, the crusting of the soil surface, and the use of poor quality seed could adversely affect emergence.

Failure to pickle the grain may also lead to a decrease in emergence.

In many instances poor emergence in the field can be associated with one or more of the factors mentioned above. However, there have been a number of cases in which poor emergence has been associated with the presence of straw residues alone. The general practice in West Australia is to stubble-burn before the land is prepared for seeding, but in some instances this is impossible or is not carried out thoroughly.

The following experiment was undertaken to determine the effect of straw on the emergence of wheat seedlings.

Experimental details

The experiment was sown on well-drained soil at Avondale Research Station, Beverley, in late June, 1966.

Seed of the wheat variety Gamenya was used. Portion of the seed was dusted with Ceresan at the rate of 2 oz per bushel before sowing. The grain was planted at a depth of 2½ inches and was placed either immediately beneath or a ¼ of an inch above a layer of oaten straw, except in the control plots which received no straw.

The oaten straw was evenly distributed in the experimental area at the rate of 2.4 lb. per 10 sq. feet. Ten rows of 10 seeds were planted in each plot (immediately after the straw was distributed), seeds were placed 2 inches apart, in rows 6 inches apart. Each treatment was replicated three times.

The soil was moist at sowing and germination occurred immediately. Emergence was recorded six weeks after sowing.

Results and discussion

The presence of straw, irrespective of its placement in relation to the seed, had a marked effect on emergence. Seed planted above the straw germinated but seedlings failed to emerge. The roots of such plants were stunted, distorted, and the tips darkened.

It is well known that plant decomposition products or substances from plant residues affect the germination, emergence, and growth of various plants (McCalla and Haskins, 1964). Such substances were probably responsible for the poor emergence noted above.
Table 1.—The influence of oaten straw on the emergence of wheat seedlings

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Percentage Emergence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dust seed</td>
</tr>
<tr>
<td>Seed planted under straw</td>
<td>4.3</td>
</tr>
<tr>
<td>Seed planted above straw</td>
<td>47.0</td>
</tr>
<tr>
<td>Control—no straw used</td>
<td>88.3</td>
</tr>
</tbody>
</table>

The dust X straw interaction was not significant. The three basic treatments were significantly different from each other at the 0.1% probability level.

Few seedlings emerged when seed was placed under the straw. This was probably caused both by toxic products and physical resistance of the straw to penetration by the seedlings.

Although only oaten straw was tested for its effect on emergence it is believed that other cereal, grass and pasture residues would affect emergence under certain conditions. It has been found elsewhere that a variety of plant residues are capable of reducing the emergence of a particular crop (McCalla and Haskins, 1964).

In the above experiment seed dusting had no general effect on emergence. However, this is not always the case.

References


