shown in Table 1. As an average of all comparisons, B14 crosses yielded 19.8% less grain than B14 crosses. The F value, which was based on only 1 degree of freedom for each mean square in the combined analysis, was significant at the 5% level. The decrease in yield ranged from 15.5% for the R168 crosses to 23.5% for the Oh7K crosses, and this variation gave a highly significant F value for the interaction B14A vs. B14 × testers. The yield reduction was least with the earliest cross. Relative to the stage of plant growth, infection occurred at a later stage in the earlier cross and had less effect on grain yield. Similarly, late planted material would probably suffer a greater loss than early planted material. Interactions involving B14A vs. B14 and years were not significant. Hooker obtained a yield decrease of 6.3% when B14 was compared with B14A in single crosses with Oh4. He estimated 30.4% rust infection, which was less than estimated in the present experiments.

The amount of rust in the inoculated experiments was much more than usually occurs in corn fields. Therefore, the yield losses were greater than usually occurs naturally, except in exceptional cases. The hybrids grown in the Corn Belt constitute an extremely heterogeneous population with parent materials that are variable in both seedling and mature plant resistance. A host of this type is a natural deterrent to the rapid build-up of a few highly virulent rust races. If the present trend toward the use of single crosses should continue, the heterogeneity of the corn population will decrease, and this could create a more suitable host relationship for the pathogen. The data obtained in this study give an indication of the potential damage that may be caused by P. sorghi.

There were no differences in dates of silking between B14A and B14 crosses. However, B14A crosses were higher in grain moisture than B14 crosses in the inoculated experiments, the differences being 3.6% in 1962 and 1.2% in 1963. The moisture differences were highly significant in each year. The greater differences in 1962 than in 1963 was probably a result of the higher level of grain moisture at harvest in the first year. The B14A vs. B14 × testers interaction was highly significant in 1963 but nonsignificant in 1962.

The B14A crosses retained their leaves in a relatively healthy state for 60 to 70 days after silk emergence. By contrast, much of the leaf surface of the B14 crosses was dead by 70 days after silking. Presumably, the grain moisture in susceptible plants would start to decrease earlier than in the resistant plants.

The performance of B14A in hybrids is at least equal to B14 under natural conditions of rust infection. Therefore, B14A should replace B14 in commercial uses because, if more extensive natural rust development occurs, considerable loss of grain yield will be avoided.

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Table 1. Comparisons of B14A and B14 crosses for grain yields in pounds per plot at 15.5% moisture under artificial epiphytotics of Puccinia sorghi averaged over 2 years.

<table>
<thead>
<tr>
<th>Cross</th>
<th>B14A</th>
<th>B14</th>
<th>Difference % of B14A</th>
</tr>
</thead>
<tbody>
<tr>
<td>R168</td>
<td>17.6</td>
<td>15.9</td>
<td>15.5</td>
</tr>
<tr>
<td>Oh7K</td>
<td>17.0</td>
<td>13.9</td>
<td>23.5</td>
</tr>
<tr>
<td>Oh4</td>
<td>15.9</td>
<td>12.8</td>
<td>21.7</td>
</tr>
<tr>
<td>Average</td>
<td>16.2</td>
<td>14.6</td>
<td>19.8</td>
</tr>
</tbody>
</table>

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A MODIFIED MAGNETIC SEED SEPARATOR FOR LABORATORY USE

B. R. Gregg

MAGNETIC separators are widely used by the seed industry to separate certain weed seed from crop seed. These machines prepare seed for separation by first applying a small amount of liquid to the seed mass. Seeds differ in ability to absorb moisture, according to their surface characteristics. Finely-ground iron powder is then blended with the seed mass, and adheres to that seed that are moist or sticky. A single layer of seeds then passes a strong magnet, where seeds which retain iron powder are separated from those which did not hold iron powder.

Suitable laboratory-size magnetic separators could be very useful in seed research and testing. Laboratory models of the Gompper Electromagnet Machine and the Grisez Permanent Magnet Machine are available, and have been used on small samples with success. Several important weed seeds can be removed very effectively from crop seed. Preliminary results indicated that a high portion of mechanically-chipped, damaged legume seed could be removed from undamaged seed.

A laboratory Grisez Permanent Magnet Separator with the modification shown in Figure 1 proved to be very effective for small samples. These included an aluminum feed hopper of approximately 1/2-gallon capacity mounted on the vibratory feeder. An adjustable feed gate allows uniform feeding onto the revolving drum which contains the separating magnet.

Figure 1. Modified magnetic separator.

The separator was mounted on an angle-iron stand, and discharge spouts were extended through the bottom and side of the separator. The two separate seed fractions are discharged into containers outside the separator.

The glass jar mounted at an angle on the side of the separator blends liquid and iron powder into a second test sample while the first sample is being separated. During this time the operator is free for other work.

This modified laboratory separator proved to be simple to operate, fast, self-cleaning, and made accurate separations. It requires little space, and can be operated on a laboratory table without permanent mounting.

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