Chemical Defoliation of Cotton

IV. Lodging in Bottom Defoliated Cotton

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ACALA-44, a commercial variety of Upland cotton cultivated extensively in Arizona, has a tendency to lodge toward the end of the growing season. Since lodging aggravates boll rotting and interferes with efficient mechanical harvesting, any cultural practice that lessens the difficulty would be advantageous.

It has been observed that lodging was not as pronounced in chemically bottom defoliated cotton as in non-defoliated cotton. An experiment was designed, therefore, to determine (a) whether or not lodging actually is reduced when cotton is bottom defoliated, (b) if the difference is due to the chemical defoliant or to leaf removal per se, and (c) if variety interactions occur.

Several varieties which had exhibited differences with respect to lodging in other experiments were chosen for an experiment conducted in the field at Sacaton, Ariz., in 1954. The varieties tested were two Upland cottons, ACALA-44 and AxD, and two American-Egyptian cottons, Pima S-1 and S-71. Since the degree of lodging usually is more pronounced in closely spaced cotton, plants were spaced at approximately 3 inches in the row. The lower portion of the plants, one-third of the plant height from the ground level, was defoliated when the lower bolls had reached maturity. Bottom defoliation was accomplished on Sept. 14 by two entirely different methods: (1) a chemical defoliant, AERO Cyanamid Soluble (monosodium cyanamide, 85%), applied with ground machinery at a rate of 8 pounds per acre, and (2) stripping the lower leaves by hand. Non-defoliated plants constituted the control plots. Treatments were replicated three times in a split-plot design with varieties as main plots and treatments as sub-plots.

The amount of lodging was determined on Nov. 1. This date was considered as an appropriate time to harvest the crop. The perpendicular distance from the ground to the tip of the inclined main stalk, and also the length of the main stalk, were determined for plants in each sub-plot. The cosine of the angle that the plant made with the perpendicular was determined from these measurements and then converted into degrees. Consequently, a high value in table 1 would indicate a greater amount of lodging than a low value.

The degree of lodging was significantly less in bottom defoliated cotton regardless of the method of leaf removal. The mean differences between the control and treatments (1) and (2), respectively, were 18 and 15 degrees. The mean difference of 3 degrees between the chemically defoliated and the "hand" defoliated plants was not significant. It would appear, therefore, that leaf removal per se, regardless of the method, is the determining factor in the reduction of lodging in bottom defoliated cotton.

Since the analysis of variance gave no significant treatment x variety interactions, it is concluded that the varieties responded in the same manner to the treatments.

Bottom defoliation of rank cotton hastens the opening of mature bolls, reduces the possibility of boll rot, and also acts as a late season method of weed control, i.e., a substitute for a late cultivation. The reduced amount of lodging found in bottom defoliated cotton, which would facilitate mechanical harvesting, points up an advantage of bottom defoliation additional to those enumerated previously.

The data from this experiment indicate a need for further investigations to ascertain the reasons for a reduction in lodging occasioned by removal of the lower leaves.

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3 Brown, L. C., and Rhyne, C. L. Unpublished data.

Table 1.—Angle of bend expressed in degrees as measured from the perpendicular.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Variety</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A-44</td>
<td>AxD</td>
</tr>
<tr>
<td>1. Chemically defoliated</td>
<td>37°</td>
<td>26°</td>
</tr>
<tr>
<td>2. Hand defoliated</td>
<td>39°</td>
<td>29°</td>
</tr>
<tr>
<td>3. Control</td>
<td>55°</td>
<td>42°</td>
</tr>
<tr>
<td>Mean</td>
<td>44°</td>
<td>32°</td>
</tr>
</tbody>
</table>

L.S.D. for comparing variety means: 5% = 7°
L.S.D. for comparing treatment means: 5% = 4°; 1% = 5°
No significant interaction between varieties and treatments.