The Relative Growth Rates of an F₁ Hybrid of *Gossypium hirsutum* and Its Two Parents

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The commercial utilization of hybrid vigor in corn has furnished the impetus for experimental programs designed to spread this practice to other crops. During recent years a number of investigations have been conducted to determine the extent of hybrid vigor manifested in cotton (*Gossypium*) hybrids. The literature relating to the problem has recently been reviewed by Loden and Richmond.

Previous investigations of hybrid vigor in F₁ hybrids of cotton have been concerned primarily with the measurement of heterosis as expressed in increased yield of lint and seed. Since the existence of heterosis in cotton has been amply established, an experiment was designed to study (1) the point in the growth period in which hybrid vigor became evident and (2) the effect of heterosis on various plant parts. Similar investigations have been reported by Luckwill with *Lycopersicon*, Whaley, et al. with *Zea mays* L., and others.

EXPERIMENTAL PROCEDURE

The investigations were conducted in 1950 at the Southeastern Soil Conservation Experiment Station, Watkinsville, Ga.

The F₁ seeds used were produced from a cross of Deltapine 15 (designated "Green") × Synthetic Line 7–9 (designated "Red"). The Red Line is a non-commercial, red-leaf, multiple-marker stock developed by D. T. Killough, Texas Agricultural Experiment Station, College Station, Tex.

Eighty-eight complete blocks, each containing the Red and Green Parents and F₁ were randomized and planted May 24. Each block was bordered by a guard row on either side. The one-row plots, each containing 14 hills thinned to 1 plant each, were 28 by 3½ feet in size. All plots received normal cultural practices.

To determine the point in the growth period at which an expression of heterosis might become evident, and to determine the plant parts affected, the following characters were measured each week beginning June 21: length of stems, dry weight of stems, dry weight of the above-ground plant, number of squares, and number of fruits. Growth curves were computed for each entry from the mean of each character. Leaf blade area and weight measurements were also taken on Sept. 2 and 11, respectively.

Eight randomly chosen replications were harvested each entry on Sept. 2. The leaves were taken from the main stem of the plant below the fifth node from the terminal bud. The leaf blades (petioles removed) were oven-dried and weighed. The total dry weight of the above-ground plant was computed by summing the dry weights of leaves, stems, and fruits.

Fifty mature leaves were harvested from five replications of each entry on Sept. 11. The leaf blade outlines were traced on bond paper of tested uniformity. The paper area was then weighed as a relative measurement of leaf blade area.

Analyses of variance were run for each character, and individual degrees of freedom were computed to test for significance.

RESULTS AND DISCUSSION

Indications of hybrid vigor were evident when the F₁ hybrid was compared to the mean of the parents for the characters dry weight of stems, dry weight of leaves, dry weight of fruits, total dry weight of above-ground plant, number of squares, number of fruits, and leaf blade area and weight. There was no expression of hybrid vigor in the stem length.

A correlation coefficient was computed for the data on the paper weight and found to be 0.9999.

Hybrid vigor as used in this investigation appeared in character development in the F₁ generation and not in the mean value for the parents.

<table>
<thead>
<tr>
<th>Character</th>
<th>Total</th>
<th>F₁ favoring</th>
<th>F₁ lower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seedling time (days)</td>
<td>49</td>
<td>11</td>
<td>38</td>
</tr>
<tr>
<td>Number of squares</td>
<td>11</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Number of fruits</td>
<td>9</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Leaf blade area</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Leaf blade weight</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

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