CROSS POLLINATION TECHNIQUES WITH COTTON, *Gossypium Hirsutum* L.¹

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HAND pollination techniques currently in use provide some protective covering for the emasculated cotton flower both before and after pollination. The purpose of such covering is primarily to prevent contaminating pollination from unwanted sources.

The use of any common method of protecting emasculated flowers requires considerable time in making a cross. Crossed seed is, therefore, expensive and quantities of such seed for experimental use are sometimes limited. If flowers could be emasculated, left exposed, and pollinated later, the expense of hybrid seed would be greatly reduced. If hybrid seed were being produced for purposes where absolute purity was not necessary, the greater volume and reduced expense would seem desirable.

Cotton pollen is not normally wind-blown. Various types of bees including the honeybee, *Apis mellifera* L., and the bumblebee, *Bombus spp.*, are considered to be the primary pollen vectors for cotton in most areas.

Tu (5) worked with emasculated flowers in an attempt to estimate the percentage of natural crossing. He found that the bolls set on emasculated flowers ranged from 8.4 to 106.7% of the bolls set on unemasculated flowers. More recently, Nersesjan (3) in Armenia reported that of flowers emasculated and left in the presence of bees, 96% set bolls with normal numbers of seed.

Natural crossing on unemasculated flowers in the Athens, Georgia, area was reported as 10.5% in 1948, 42% as a 3-year average 1950 through 1952 (4), and 40% as a 3-year average 1957 through 1959 (1).

McLendon (2) reported that red leaf color, caused by an anthocyanin pigment, is simply inherited in a monohybrid ratio. Red color is partially dominant over green so that the heterozygote is distinguishable from either homozygote.

Table:<br>

<table>
<thead>
<tr>
<th>Date</th>
<th>Flowers Emasculated</th>
<th>Bolls Set</th>
<th>Crossed Seed</th>
<th>Natural Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>First date</td>
<td>100</td>
<td>8.4%</td>
<td>13%</td>
<td>6%</td>
</tr>
<tr>
<td>Second date</td>
<td>100</td>
<td>10.5%</td>
<td>20%</td>
<td>8%</td>
</tr>
<tr>
<td>Third date</td>
<td>100</td>
<td>19.2%</td>
<td>37%</td>
<td>10%</td>
</tr>
<tr>
<td>Fourth date</td>
<td>100</td>
<td>30.9%</td>
<td>50%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Thirty random flowers were used for each date: June 19, June 28, July 14, and July 23. Matured bolls were harvested, ginned separately, and counted in each one.

Seed also were harvested in 1962 from RR (RR) planted in alternate rows with normal (rr) plants. 247,200 matured bolls were harvested, ginned separately, and counted in each one.

One hundred flowers on normal rr plants of an experimental synthetic variety A 6201 were emasculated, left unprotected in the presence of bees, and left unprotected on each of 3 dates in 1964: July 9, July 23, and August 4. Twenty-four hours after emasculation, all stigmas were dusted with pollen from RR plants. On each date of emasculation, 100 flowers were tagged on a row of RR plants with normal flowers on each side to be used to estimate natural crossing in the area. All RR plants were grown at a sufficient distance from the experimental area so that RR plants would be improbable.

Individual bolls produced by emasculated flowers were harvested and ginned separately. Bolls on the RR plants were pooled for dates and ginned separately. All seed were germinated in a growth control chamber and seedlings classed for leaf color.

None of the emasculated flowers set bolls in 1962. Of the 300 flowers emasculated in 1964, 81 set bolls. Of these, 19 were from the first date, 4 from the second, and 2 from the third. None of the flowers on the fourth date produced bolls. The number of seed per boll ranged from 5 to 46 with a mean of 16.

Of the 1,543 seedlings produced from emasculated flowers, 19.2% were the result of natural crossing. The percentage of bolls having at least one crossed seed was 93.4% while 47.0% of the bolls had 5 or more crossed seed. The actual percentage crossing should be somewhat higher than observed since any crosses bellow would not be detectable.

Of the 300 flowers emasculated in 1962, 110 were used when pollinated with pollen from RR plants. Seed from these bolls produced 3,772 seedlings, 10.4% were classed as Rr and represent the percentage of bolls having at least one crossed seed. Of the 120 unemasculated flowers tagged, 25 set bolls. Of these, 19 were from the first date, 4 from the second, and 2 from the third. None of the flowers tagged on the RR plants on

1964 (RR) planted in alternate rows with normal (rr) plants (rr) near the test area. Individual flowers were tagged and ginned separately. This seed was grown in the greenhouse and 1,543 seedlings were classed for leaf color to determine the amount of natural crossing.

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