Brief Articles

ACTION OF THE GENES CONTROLLING THE CHARACTER GLANDLESS SEED IN COTTON

Robert J. Miravalle

Two nonlinked genes are primarily responsible for the production of glandless seed in cotton, but two different interpretations of gene action have been published. According to McMichael, the genes involved in the production of glandless seed are recessive. McMichael symbolized the two genes gl₂ and gl₃. Roux, on the other hand, holds that the genes involved are partially dominant and symbolized them Gl₂ and Gl₃. These divergent views only add to the confusion which already exists in glandless cottonseed genetics and breeding. It is therefore fitting that an attempt be made to reconcile the results and conclusions of these two investigations.

The merits of each investigation stand unquestioned. Essentially identical observations were made, namely, that a cross between glandless seeded and normally glanded seeded plants segregates 15 glanded seeds to 1 glandless seed in the F₂. McMichael observed this segregation with F₂ seedlings while Roux observed it with cut F₂ seeds. Roux divided the F₂ seeds into 3 categories based upon the number of glands present. McMichael made a similar type of classification but did not publish the results in this form.

Roux found that, in an F₂ from a cross between "complete glandless" and normal, three categories of seeds could be clearly distinguished:

- "completely glandless seeds"
- "seeds showing one to a few glands visible on a transverse section"
- "normal seeds, or seeds showing a certain reduction of glands (difficult to distinguish from each other precisely, but very different in appearance from the two preceding categories)" (English translation by Mrs. Vesta G. Meyer, Delta Branch Experiment Station, Stonville, Miss.)

Roux reported the following observed and expected distributions in this F₂ generation:

<table>
<thead>
<tr>
<th>Seed category</th>
<th>No. observed</th>
<th>No. expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely glandless</td>
<td>15</td>
<td>13.6 (1/16)</td>
</tr>
<tr>
<td>Few glands present</td>
<td>25</td>
<td>27.2 (2/16)</td>
</tr>
<tr>
<td>Normally glazed or glands slightly reduced</td>
<td>178</td>
<td>177.2 (13/16)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>218</td>
<td>218</td>
</tr>
</tbody>
</table>

The goodness-of-fit chi-square is 0.326 (P = .80 to .90, 2 degrees of freedom). A good fit to the expected ratio 1:2:13 is indicated.

One could conclude on the basis of seed glands that glandlessness is partially dominant to glandedness in these cotton cultivars.

Moreover, if the genes act as partial dominants, we would expect the cotyledons of the doubly heterozygous plants to have obviously fewer glands than normal. In the production of the least frequent phenotype, one might expect the cotyledons of the doubly heterozygous seedlings to be clearly distinguished:

- "normally glanded cotyledons"
- "glands showing no difference or perhaps slightly less than normal"
- "glands showing decrease or absence of glands" (difficult to distinguish from each other precisely, but very different in appearance from the two preceding categories by Roux's and McMichael's interpretation and terminology). The two independent, complementary-type genes which are primarily responsible for the production of glandless cottonseed act in combination as recessives and are symbolized as gl₂ and gl₃.

A STUDY OF TECHNIQUES FOR EVALUATING SEED SET IN DALLISGRASS

B. J. Johnson and E. C. Holt

DALLISGRASS, Paspalum dilatatum Poir., is recognized as one of the more desirable forage species in the Southern States. Its most serious limitation is the production of poor quality seed. Under favorable environmental conditions, common dallisgrass can produce seed material varying in caryopsis content from 0% to 40%. Extreme variation in seed quality makes evaluation of lines difficult. The usual method of evaluating breeding material for seed quality is the bagging of inflorescences at anthesis in order to avoid seed from shattering. Since the plant is self-fertilized, it was assumed that bagging would have no detrimental effect on seed set. However, it has been shown that seed setting is sensitive to environmental conditions. Therefore, this experiment was designed to study the variations in seed set within and among dallisgrass lines as influenced by various seed collection methods and insect control.

Plant material used in the experiment consisted of X₄ lines, derived from irradiated material and for assistance in conducting the study. Journal Series paper No. 412 of the Georgia Experiment Station, Experiment, Ga. Contribution of Crops Research Division, Agricultural Research Service, USDA. Received Feb. 15, 1962. Formerly Graduate Assistant (now Assistant Agronomist, Texas Station and ARS, CRD). Acknowledgment is

Part of a thesis submitted by the senior fulfillment of requirements for the M.S. degree at Texas A & M College, College Station, Texas, 1961. The study was supported by the Texas Station and ARS, CRD. Published September, 1962.