Published September, 1962

# Brief Articles

## ACTION OF THE GENES CONTROLLING THE CHARACTER GLANDLESS SEED IN COTTON[1]

Robert J. Miravalle[2]

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,[3] the genes involved in the production of glandless seed are recessive. McMichael symbolized the two genes $gl_2$ and $gl_3$. Roux,[4] on the other hand, holds that the genes involved are partially dominant and symbolized them $Gl_2$ and $Gl_3$. 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 $F_2$. McMichael observed this segregation with $F_2$ seedlings while Roux observed it with cut $F_2$ seeds. Roux divided the $F_2$ 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 $F_2$ 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 $F_2$ generation:

| Seed category | No. observed | No. expected |
|---|---|---|
| Completely glandless | 15 | 13.6 (1/16) |
| Few glands present | 25 | 27.2 (2/16) |
| Normally glanded or glands slightly reduced | 178 | 177.2 (13/16) |
| TOTAL | 218 | 218 |

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 reduction in seed glands that glandlessness is partially dominant to glandedness. However, the difficulty with which the phenotypes in the "normally glanded" category could be precisely distinguished seems to argue against such a conclusion. Furthermore, if the genes act as partial dominants, one might expect the cotyledons of the doubly heterozygous seedlings to have obviously fewer glands than normal seedlings, but the two types of seedlings are impossible to distinguish accurately on the basis of cotyledonary gland content.[5]

On the other hand, if one bases his conclusion on the presence or absence of seed glands, as did McMichael,[3] then one would assign recessiveness to the genes involved in the production of the least frequent phenotype, i.e., seeds without glands. Genetic convention is more closely followed by this latter interpretation.

On the basis of Roux's[4] own data and the data of McMichael[3] and from the experience of Miravalle and Hyer,[5] it seems more judicious and appropriate to accept McMichael's interpretation and terminology, namely, that the two independent, complementary-type genes which are primarily responsible for the production of glandless cottonseed act in combination as recessives and that they are symbolized as $gl_2$ and $gl_3$.

[1] Contribution of Crops Research Division, Agricultural Research Service, USDA. Received Feb. 5, 1962.

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[3] McMichael, S. C. Combined effects of glandless genes $gl_2$ and $gl_3$ on pigment glands in the cotton plant. Agron. J. 52:385–386. 1960.

[4] Roux, J. B. La selection de cotonniers sans gossypol. Coton et Fibres Tropicales 15:1–14. 1960.

[5] Miravalle, R. J., and Hyer, A. H. Identification of the $Gl_2$ $gl_2$ $Gl_3$ $gl_3$ genotype in breeding for glandless cottonseed. Crop Sci. 2: 395–397. 1962.

## A STUDY OF TECHNIQUES FOR EVALUATING SEED SET IN DALLISGRASS[1]

B. J. Johnson and E. C. Holt[2]

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.[3, 4] Under favorable environmental conditions, common dallisgrass can be expected to produce seed material varying in caryopsis content from 0 to 40%.[3, 4] Extreme variation in seed quality within lines makes evaluation of lines difficult. The usual procedure in evaluating breeding material for seed quality is the bagging of inflorescences at anthesis in order to avoid loss of any seed from shattering. Since the plant reproduces apomictically, 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.[3] Thus, this experiment was designed to study the variation 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 eight $X_2$ lines, derived from irradiated material and selected for

[1] Portion of a thesis submitted by the senior author in partial fulfillment of requirements for the M.S. degree at Texas A & M College, College Station, Texas, 1961. The study was supported jointly by the Texas Station and ARS, CRD. Acknowledgment is made to E. C. Bashaw, Geneticist, ARS, CRD, for plant materials and for assistance in conducting the study. Journal Series paper No. 412 of the Georgia Experiment Station, Experiment, Ga. Received Feb. 16, 1962.

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[3] Novosad, A. C. The influence of environmental factors and strains on seed set in Dallisgrass, *Paspalum dilatatum* Poir. M.S. Thesis, Texas A & M College. 1954.

[4] Owen, C. R. Improvement of native dallisgrass in Louisiana. Louisiana Agr. Exp. Sta. Bul. 449. 1951.