Recent Studies on the Genetics of the Soybean

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In connection with the investigational work on soybeans being carried on at the Illinois Agricultural Experiment Station in cooperation with the Division of Forage Crops and Diseases, Bureau of Plant Industry, U. S. Dept. of Agriculture, the genetics of the soybean occupies a prominent place. Because of the growing interest in this new crop, particularly from the breeding standpoint, it has seemed desirable to present briefly the results of recent genetic studies. This account is divided into two parts, namely, (a) a description of new chlorophyll-deficient types, together with any available data on mode of inheritance, and (b) a discussion of new linkage relationships.

New Chlorophyll-Deficient Types

The $y_4$ type is a yellowish-green type found in F. P. I. 65388, a small-seeded brown bean obtained from the Division of Forage Crops and Diseases, U. S. Dept. of Agriculture. The original lot of seed was treated with radium by Doctor J. T. Buchholz, Botany Department, University of Illinois. The mutant appeared in the progeny of a plant grown from one of these treated seeds. The ratio was 22 normal to 3 yellow. Fifteen of the normal green plants were tested in the greenhouse. Of these, 4 bred true for green and 11 segregated in approximately a 3:1 ratio. The evidence seems clear, therefore, that the mutant is a simple recessive to the normal.

The $y_5$ type is a greenish-yellow type first observed as a mutant in the Wilson V variety. It bred true from the first. A cross was made with the Virginia variety. Two $F_1$ plants were produced, both normal green. Of 104 $F_2$ plants, 80 were normal, 24 greenish-yellow. In the $F_3$ generation, of 36 families grown, 12 bred true for green and 24 segregated in a 3:1 ratio.

Both $y_4$ and $y_5$ are weak, although $y_5$ is the better of the two. They are easily distinguished from each other in appearance. The chlorophyll of $y_4$ is uniformly reduced, so that the leaf surface has a uniform appearance, while in $y_5$ there are areas in the leaf of varying chlorophyll intensities. The leaf seems to change from yellow to green and back again as it is turned at various angles to the sun.

In the cross between $y_5$ and Virginia, two other pairs of genes were involved, namely, $Tt$ (tawny vs. gray pubescence) and $Rr$ (black vs. brown coat color). The results given in Table 1 indicate independence between these and $y_5$.

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