EFFECT OF LUTEUS GENES ON LONGEVITY OF SEED IN MAIZE

MARTIN G. WEISS AND JOHN B. WENTZ

IN linkage studies with maize during the winter of 1934–35, it was found that seed of F₂ progenies which had given good 3:1 ratios of normal and luteus₂ seedlings the previous year were, after the year in storage, showing distinct shortages of the yellow seedlings. This led to the suspicion that possibly the luteus₂ gene in the homozygous condition had affected the viability of the seed. The purpose of the study reported in this paper was to determine the effect of each of the several luteus genes in maize on the longevity of the seed and on the rate of germination and growth of the seedlings.

MATERIALS

Eight genes have been reported which produce the luteus (yellow seedling) character in maize. The authors were able to obtain seed adapted to this problem of all of the luteus stocks excepting luteus₃ and luteus₅.

All of the luteus genes behave as single genetic recessives. Luteus₁, however, does not express itself phenotypically unless it occurs in the double recessive condition with a white, virescent, or striped seedling factor.

The luteus material used was homozygous for that gene and segregating for a white and a virescent seedling character causing 3:1 and 9:7 ratios of normal to luteus seedlings, depending upon whether the progenies were segregating for one or both of the accompanying characters.

Because of the close linkage between a gene causing small pollen and differential fertilization and the allelomorph of luteus₂ in the seed used, abnormally large proportions of luteus₂ seedlings were obtained. Comparative percentages of luteus seedlings obtained at different planting dates were consequently used as an indication of the effect of luteus₂ on the longevity of the homozygous luteus₂ seeds.

The luteus₂ and luteus₅ progenies were also segregating for virescent₂₅, and half of the luteus₂ progenies were segregating for a white seedling character. This offered an opportunity to observe any effect of the virescent and white genes on germination and vigor of seedlings.

Of the luteus₂ seed available, some of the progenies were segregating for an unknown virescent seedling character. In these progenies, because of the small quantity of seed, the normal and virescent seedlings were grouped together.

METHODS OF PROCEDURE

Seed from progenies segregating for luteus genes was planted in flats in the greenhouse at various intervals of time after harvest, and the percentages of normal and luteus seedlings compared with the percentages which had been obtained when seed of the same progenies was planted soon after harvest.

1Journal Paper No. J386 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 182. Received for publication October 28, 1935.
2Formerly graduate student, Iowa State College, now Junior Geneticist, Division of Forage Crops and Diseases, Bureau of Plant Industry, U.S. Dept. of Agriculture, and Associate Professor of Farm Crops, respectively.
3The luteus₂ seed was supplied by Dr. E. W. Lindstrom and the luteus₅, luteus₄, and luteus₅₅ seed by Dr. M. M. Rhoades.