

change. Forty-four of the changed plants were examined for pollen fertility. In general the pollen fertility was higher in red anthers than in the green ones. Similar changes were observed with the $\underline{A} \underline{B} \underline{P}_1 \underline{R}^F$ homozygous stock but the incidence was much lower and the sectors very much smaller.

These observations are not readily explained in conventional terms. Since the colored anther color phenotype is dominant over the green anther phenotype, a simultaneous mutation or deletion of the \underline{P} component of \underline{R}^F locus would have to occur in both chromosomes to manifest this change in the first generation. This is highly improbable from what we know of the mutation rates of certain gene loci. The determination of the basis of this change must await further work.

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1. Male-sterility as affected by seed storage.

Seed of Llera III, a derivative of the Tuxpeno race of maize from Mexico, was produced by sib pollination during the 1963 winter at Hyderabad. During summer 1965 a yield trial was planted at Indian Agricultural Research Institute, New Delhi, in which Llera III was one of the entries. While taking notes on various characters it was observed that Llera III had 2.9 per cent male-sterile plants. The anthers of the male-sterile plants were shriveled and there was no pollen formation in any of the anthers. When a random sample from the same seed lot of Llera III, which was increased at Hyderabad during the 1963 winter, was grown at the Birla Institute of Scientific Research, Rupar, during the 1967 summer, 12.5 per cent male-sterile plants were observed--an increase of 9.6 per cent over what was observed in 1965 summer.

Two possibilities seem to have given rise to an increased percentage of male-sterile plants during the 1967 summer, when the source of seed for both the years of study happened to be the same. Either there has been inadequate sampling during the 1965 study or else the seed storage for another two years has resulted in an increase of male-sterile plants in the population. Such a storage effect has been noted in mutation studies.

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1. Analysis of variation of an autodiploid strain of maize by means of diallel cross analysis.

In genetic studies, especially for quantitative characters, it is sometimes very important to have available strains with an homogeneous genotype;

therefore the possibility to produce autodiploid strains, that are strains resulting from the duplication of a haploid genome, was regarded as a possibility to provide better tools for genetic studies. On the other hand, Sprague et al. (1960) have shown that in autodiploid strains there is a very high rate of spontaneous mutagenesis, thus pointing to the problem of maintenance of homogeneity of these strains over a number of generations.

It seemed of interest to us to investigate the relative importance of spontaneous mutagenesis in changing the homogeneity of an autodiploid strain, and also the possible relations between the occurrence of spontaneous mutation and the establishment of overdominance phenomena.

Plants derived from a single grain of an autodiploid ear of maize, stock HD 73, 1375/II, kindly supplied by Prof. Sprague, were reproduced by selfing through 4 generations. The F_4 plants were classified according to the pedigree in five groups obtained from five F_2 plants.

In 1965 using five parents, one from each line and generation of selfing, we realized all possible crosses within generations, obtaining three series of crosses, classified according to the generation of selfing from which the parents were taken.

The F_1 plants, together with their parents were sown in 1966 following a randomized block experimental scheme, replicated four times. The height of the plant was measured and the data analyzed following the method of Hayman (1954).

Table 1 summarizes the estimates of the components of variance, obtained from the analysis, together with their standard errors.

Table 1
Estimates of components of variance for the height of the plant from the diallel analysis

	Parents from F_2	Parents from F_3	Parents from F_4
D	5.54 ± 0.75	5.72 ± 1.80	4.53 ± 0.60
F	6.17 ± 1.88	0.01 ± 4.49	1.36 ± 1.49
H_1	0.55 ± 2.03	-3.27 ± 4.86	-1.88 ± 1.41
H_2	-23.76 ± 1.84	-82.92 ± 4.41	-34.47 ± 1.46
h^2	-2.03 ± 1.34	-5.01 ± 3.20	0.04 ± 1.60
$H_2/4H_1$	11.0	6.3	4.9
h^2/H_2	0.86	0.64	0.00

The results obtained show that the additive portion of variation is highly significant in all the three series of crosses considered, whereas the estimates of H_1 are not statistically different from zero. These results suggest that the determination of the height of the plant in our material is completely additive.

Table 1 shows also that the estimates of the H_2 component are statistically different from zero, whereas the estimates of h^2 are not significant. As a consequence the estimator, $H_2/4H_1$, which is expected to give a measure of asymmetry, is very high, while the estimator, h^2/H_2 , indicates that a very small number of groups of genes are involved in the manifestation of the variability observed.

Considering all the results obtained we should draw the conclusion that between plants derived from a single grain of an autodiploid strain there are differences which are genetically determined in an additive way. The high values of the asymmetry estimator suggest that over all loci there is a disproportion between the number of alleles of different types (+ and -). This supports the hypothesis that the autodiploid strain was originally very homogeneous and that the additive genetic variability observed is not probably due to residual heterogeneity, but mostly to spontaneous mutations. This view is also supported by the low value of the estimates of the number of groups of genes involved in the manifestation of the variability present in the considered population.

References

- Hayman, I. B., 1954. The theory and analysis of diallel crosses. Genetics 39: 789-809.
- Sprague, G. F., Russell, W. A. and Penny, L. H., 1960. Mutations affecting quantitative traits in the selfed progeny of doubled monophloid maize stocks. Genetics 45: 855-866.

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1. Further studies on teosinte chromosomes.
 - a. Huixta Teosinte. Microsporocytes of five F_1 hybrids of Huixta teosinte and maize were cytologically investigated. The teosinte seeds employed in this study are different from those studied previously (Cytologia, Ting, 1958). At pachytene, seven chromosome knobs, all terminal, were observed. Except for those on the long arms of chromosomes 4 and 8, all of them were homozygous. This is the first report that only terminal knobs were present in this teosinte. However, in a few cases asynapsis involving the distal one-third of the short arm of chromosome 4 was identified.