

14. Mutation load accumulated after six generations in isolation by a teosinte introgressed population of Al58.

Previous sampling of an isolation block of intercrossing teosinte derivatives of Al58 showed no significant change in yield but a drop in shelling percentage after four generations (MNL 36). Because the teosinte chromosomes in this material are known to be mutagenic, especially when heterozygous (MNL 34), we sampled 504 self-pollinated ears from the sixth generation and scored them for mutation load of seed and seedling abnormalities. Forty-one percent of the seedling mutations had effects on the mature plant. Many mutations having phenotypes expressed in the mature plant alone were probably missed because a sample of 35 of the more tripsacoid ears grown to maturity in the field yielded 7 or 20 percent mutations which would not have been detected in sand flat cultures.

| Stock                  | No. Ears Scored | Percent with Abnormalities |          |              |
|------------------------|-----------------|----------------------------|----------|--------------|
|                        |                 | Seed                       | Seedling | Mature Plant |
| General Population     | 469             | 2.7                        | 6.7      | No data      |
| Highly Tripsacoid Cobs | 35              | 2.8                        | -        | 20.0         |

In addition to defective seed and dwarfs of various sorts, such well known mutants as glossy, virescent, albescent, albino, adherent, narrow leaf, pale green, and golden occurred. The presence of adherent (ears 63-353 and 63-370) is of interest because this is the only one out of eleven variable characters obtained from the Maize Coop collection which has not previously associated with tripsacoid cobs in an earlier study (MNL 37).

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15. Lignin content as a new measure of introgression.

Small sections of various maize cobs and individual rachis segments of maize relatives were immersed in 72% sulphuric acid for six hours at room temperature. In the process of acid erosion, cellulose and other polysaccharides are removed leaving behind lignin and a small amount of ash.

While definite conclusions cannot yet be drawn from these data, there is evidence that lignin determination is a refinement in evaluating introgression. This method and the relation between lignin content and internal cob morphology are being studied in detail.

The objective of this work is to investigate the heterotic effects of introgression in Corn Belt inbreds and perhaps to establish one basis for predicting the combining ability of inbreds.

Table 1  
Percent Lignin Content of Cobs and Rachis Segments of Various Maize  
Lines and Maize Relatives

|                         | Percent |               | Percent |
|-------------------------|---------|---------------|---------|
| Tripsacums              |         | Maize Inbreds |         |
| floridanum              | 54      | WF9           | 68      |
| dactyloides (2n)        | 48      | I11A          | 68      |
| Teosintes               |         | L317          | 64      |
| Americameca             | 72      | C103          | 63      |
| Chalco                  | 64      | 0h07          | 60      |
| Honduras                | 32      | W22           | 58      |
| Maize-teosinte Hybrid   |         | 38-11         | 56      |
| Al58 x Florida teosinte | 79      | 0h51A         | 56      |
| Maize Varieties         |         | 0h40B         | 55      |
| Parker's Flint          | 58      | 0h45          | 54      |
| Wilbur's Flint          | 56      | 0s420         | 49      |
| Gourdseed               | 53      | I11Hy         | 42      |

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1. A high frequency of hybrids between certain genetic stocks of maize and Illinois Tripsacums.

An effort was made in 1963 to cross certain heterozygous translocation stocks with plants of *T. dactyloides* (2N + 4N), collected from different locations in Illinois. Although not all the data have been summarized, nor has the hybrid nature of all progeny been confirmed cytologically, the results merit reporting and further detailed analysis. No special crossing techniques were used other than the "shortened silk" technique of Mangelsdorf and Reeves. Embryo culture was not used to obtain any of the hybrids. However, the pericarp was removed and the "poorly developed" seeds were germinated about 30 to 40 days after pollination. The following table summarizes the data for crosses with certain maize stocks.

The data illustrate the high number of hybrids produced by certain pollinations and, also, the fact that certain female parents give a larger number of hybrids than others. One pollination (15) produced 22 hybrids (3.27%) with a diploid Tripsacum from Harvel, Illinois. The authors are not aware of any reports in the literature indicating that this many hybrids have been produced from one pollination. In the classical work reported by Mangelsdorf and Reeves only 29 hybrids were obtained when 185,000 silks on 382 ears were pollinated with Tripsacum pollen (.01%). Several factors, such as sterility of the female parent,