

*Both experimental t values are highly significant, being much larger than the tabular t at .01 of 2.71 (Snedecor Statistical Methods).

The results show that when P39 was paired with A158, the P39 component was more productive than when grown alone, but A158 with P39 was significantly less productive. Apparently P39 which has a tendency to tiller can compete more successfully than A158 which is single stalked. The net gain of 11 percent of the mixed stand over the pure stand is significant and may suggest an effect similar to heterosis, but the results are far from conclusive. A better experiment could probably be made by using two inbreds with similar or identical growth habits.

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4. Effect of natural selection on teosinte introgression.

Various teosinte derivatives of A158 were intercrossed and a blend of the resulting seed was grown in isolation for four generations (years). Reserve seed from each year was planted in a 4 X 4 latin square yield test with the following results:

Generation		Yield bu/acre	Shelling %
1 (1957)		67.2	80.1
2 (1958)		70.8	77.1
3 (1959)		69.8	78.5
4 (1960)		66.6	78.1
For	0.05	8.7	0.7
Significance	0.01	13.1	0.8

If the introgression of teosinte germplasm into corn causes evolution for increased yield, four generations of natural selection were inadequate to show it in the corn under the conditions involved in this experiment. The trial did show a significant drop in shelling percentage between the first and second generation.

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5. Colchicine induction of an amphidiploid of multiple tester corn X *Tripsacum dactyloides*.

Among the many techniques and dosages for colchicine induction of polyploidy which were tried, only one was successful in producing the desired amphidiploid of a WMT corn X *T. dactyloides* hybrid. The successful procedure was as follows: A tiller about 18 inches long with adventitious roots starting to develop near its base was cut and grown in a nutrient solution until well rooted. The plant was then transferred to a mixed solution of aqueous colchicine (1:1000) and a non-ionic wetting agent (Tergitol 1:500) for 72 hours. The plant which appeared to be almost dead after this severe colchicine treatment, was transferred to a soil-Sphagnum mixture. After two months of being nursed along, a fairly normal cluster of seven shoots had emerged.

Stomata measurements suggested that three of these seven shoots were amphidiploid and this was later confirmed in chromosome counts made by Mr. Raju. This amphidiploid is fully female fertile on backcrossing to corn.

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6. High female fertility in F_1 hybrids of corn X *Tripsacum floridanum* and their backcrosses to corn.

Not only is *T. floridanum* highly crossable with some strains of corn, as I reported in last year's News Letter, but we now know that the F_1 hybrid and its backcross to corn are highly female fertile--seed set in the F_1 was 85% and almost this high in the backcross to corn. This discovery represents an important breakthrough in both theoretical and applied work on the past and potential evolution of corn.

Such high female fertility in the F_1 and backcrosses to corn would make it easy, once a cross had occurred, for *Tripsacum* introgression into corn to occur in the wild or under conditions of primitive agriculture. It also makes the natural derivation of teosinte from such introgression seem more credible than some suggest. In this connection, we have already hybridized and backcrossed this most primitive species of *Tripsacum* with one of the most primitive living races of corn,

Confite Morocho, in an attempt to synthesize teosinte through controlled crossings. Also we are studying the inheritance of recessive marker genes of corn in corn-*Tripsacum* hybrids; this should lead to the development of a genetic map of *Tripsacum*.

A quantity of OP seed from an F_1 hybrid of A158 gl₃ X *T. floridanum* is available to those who wish to make use of it. This new source of germplasm should be especially valuable to those who are looking for new genes not presently available in corn.

Seed of *T. floridanum*, *T. dactyloides* 2n of Kansas and *T. dactyloides* 4n of Florida is also available.

W. C. Galinat

7. Chromosomes of three Mexican teosintes.

As previously reported, by crossing Mexican teosintes to a standard inbred strain of Wilbur's flint with virtually knobless chromosomes, the characteristics of the teosinte chromosomes can be determined by studies of the microsporocytes of the F_1 hybrid plants. During the past year, the following observations have been made.

Arcelia teosinte. Seed of this teosinte was collected near Arcelia, Guerrero. Of 21 F_1 hybrids of Wilbur's flint and Arcelia teosinte, only a few of the plants had good spreading pachytene chromosomes. As long as the bivalent pachytene chromosomes were clear and isolated, they appeared in close and regular association. With respect to knobs, there were two types of chromosome 1, one having a small internal knob on the short arm, the other having in addition two small internal knobs on the long arm. Chromosome 2 had two medium-sized internal knobs, one on each arm. Two types of chromosome 3 were observed, one knobless, the other with a large internal knob on the long arm. Chromosome 4 also had two types, one with a large knob on the long arm, the other, this knob and a small terminal knob on the short