

A combining ability analysis (method 2, Model I of Griffing, 1956) of the diallel crosses from the above inbreds was conducted.

Table 2  
Estimated General and Specific Combining Ability  
Effects for Yield Per Plant from Specific  
Combinations of Inbreds

Parents	Gen. Comb. Ability	Dent	Modified Dent	Modified Flint	Flint
Dent	8.50	-7.21	17.17	2.65	5.69
Modified Dent	4.80		-23.22	-1.76	1.78
Modified Flint	-4.43			6.29	-5.19
Flint	2.21				-9.41

Standard Error GCA 4.37, SCA 15.84

The estimated effects for specific combining ability, with one exception, show that morphological similarity of inbreds produces low yield in hybrids.

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7. Tripsacum or teosinte introgression an obstacle to convergent improvement.

Mangelsdorf (MNL 37) has suggested that convergent improvement is not successful in developing more productive single crosses because of the deleterious effects of homozygous blocks of genes from teosinte or Tripsacum. He further surmised that this method is not a sound means of distinguishing between the different types of gene action if these blocks of genes are partially responsible for heterosis.

This situation was tested by comparing the mean performance in hybrid combination with the degree of "tripsacoidness" of the original and recovered lines of WF9 and 38-11 (obtained from J. H. Lonquist). A tripsacoid index (Sehgal, 1964), based on the angle of rachilla inclination and induration of the rachis, was used to estimate the tripsacoid nature of each line.

Table 1  
 Mean Performance of the Original and Three Convergent  
 "Improved" Lines of WF9 and 38-11 in Hybrid  
 Combination (yield per plant in grams)

Female Parent	Male Parent				Mean
	38-11	38-11A	38-11B	38-11C	
WF9	246.8	191.6	197.9	188.1	206.1
WF9A	189.9	169.7	146.1	165.8	167.9
WF9B	220.6	186.2	176.2	170.8	188.5
WF9C	188.0	171.4	171.5	155.8	171.7
Mean	211.3	179.7	172.9	170.1	

The fact that all 15 of the crosses involving the "improved" lines are inferior in yield to the single cross of the original lines is highly significant. If differences in yield in this experiment were no more than random fluctuations, the results obtained would be expected only about once in more than 10,000 times.

Table 2  
 The Tripsacoid Index of the Original and Convergent  
 "Improved" Lines of WF9 and 38-11

Line	Index	Line	Index
WF9	26.00	38-11	23.01
WF9A	26.10	38-11A	28.45
WF9B	26.10	38-11B	32.30
WF9C	27.90	38-11C	35.80

The tripsacoid index of the lines is negatively correlated ( $r = -0.885^{**}$ ) with the mean hybrid performance of the single crosses.

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