

Errata: The following corrections should be made in the 1960 MNL.

Page 99 bottom--line 2: 9 lines, instead of 8 lines

Lines 6 and 7: X-ray machine operated at 120KV,
3mA, 1mm. Al filter, instead of
230KV, 12 mA, 4mm. Al filter.

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1. Gene action studies.

Dr. H. Carnahan, former Head, Northeastern Pasture Research Laboratory, USDA, at this Station compared diploid and autotetraploid hybrid prediction procedure in the 17th Alfalfa Improvement Conference: 19-22, 1960. He suggested that in combining diploid single crosses into double crosses the following would be true:

Differences:

Double cross vs. Mean of non-parental single crosses = Epistasis
Mean of parental single crosses vs. Mean of non-parental single
crosses = Dominance

In our discussion it was further developed:

Differences:

Double cross vs. Mean of parental single crosses = Non-Additivity

No Differences:

Double cross vs. Mean of parental single crosses = Additivity or
Cancelling Effects or Lack of Precision.

A single location, single year split plot test using this technique was planted and harvested at Centre Hall, Pa. in 1960 using early maturing, commercially useful inbred line combinations on hand. The lines involved in the 21 double crosses were: A 495, A 509, CMD 5, MS 1334, Pa 32, Pa 36, PaW 703, R 53, W 37 A, and W 59M. These 10 inbred lines are essentially unrelated, although M 13 is in the background of Pa 32, R 53, and W 59M. No reduction in vigor has been noted in crosses of these lines in this state.

Silking and strong stalks at harvest (resisting a push) were recorded as number of plants (total = 16 per plot) on an appropriate day. Yield was calculated as 56 pound bushels of 15 1/2 percent moisture shelled corn, disregarding possible differences in shelling percentage.

The data in table 1 are presented as examples only. Since a small sample of extremely early germ plasm is dealt with in only one year and one location, no conclusions are drawn at this time.

Table 1. Pa, 1960 Exp. 11. Possible gene action involved in combining single crosses into 21 double crosses.

	Grain Moisture at Harvest	Grain Yield	# Silking 2nd Date	# Silking 3rd Date	# Strong Stalks at Harvest
<u>Number of Hybrids of</u>					
<u>21 Showing:</u>					
Additive Gene Action	19	17	0	3	1
Dominance	4	4	15	18	21
Epistasis	2	0	19	16	17
<u>Means</u>					
Double Crosses	28.77%	110.3 bu.	6.05 #	12.98 #	10.79 #
Parental Singles	28.54	113.4	5.24	12.60	10.24
Non-Parental Singles	29.11	110.2	5.19	12.73	11.71
Standard Error \bar{X}	.146	.92	.023	.030	.025
<u>"F" Ratios</u>					
Hybrids	6.37**	1.63ns	2.62**	5.13**	3.85**
Components	3.70*	3.87*	4.16*	.43ns	8.90**
Interaction	1.91**	1.53*	2.71**	.95ns	1.24ns
<u>Overall Gene Action</u>					
<u>Indicated</u>					
Additive Gene Action	X				
Cancelling Effects				X	
Non-Additivity		X	X		X
Dominance	X	X			X
Epistasis			X		X

*,** = Significant at 5% and 1% level, respectively.

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