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1. Opaque-4 designation withdrawn.

The recessive endosperm mutant which was tentatively designated opaque-4 (MGCNL 40) has now been found to be an allele at the floury-1 locus. Our analyses indicate that both fl^a (supplied by Dr. Alex Paez) and o_4 are normal in lysine levels. Also both apparently have the same phenotype when in similar backgrounds. Therefore, we propose to withdraw the opaque-4 designation in favor of the earlier (Mazoti, 1940, Anales del Institute Fit, de St. Catelina 2:17-26) designation fl^a .

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1. Inheritance of date of pollen shedding in a corn diallel cross.

Pollen grain diameters measured on a number of inbred lines in 1970 (Maize Genetics Coop. News Letter 46:171-172, 1972) were used to select ten lines as parents for diallel crosses made in 1971. The parents represented a wide range of phenotype for pollen grain size but were not selected for any measurement of maturity. The complete diallel was planted in the field at Brookings, South Dakota, in 1972 with three replications of seven plant plots for each line and reciprocal cross. As the plants matured the date when four or more of the plants in a plot first shed pollen was recorded as the numerical day of the year.

Table 1 includes the means of the 100 test entries. The earliest parent was W629A which attained 50 percent pollen shedding on day 200. This was equaled by the cross W629A x A641 and its reciprocal. The latest maturing entries were the two parent lines M017 and WF9, both of which shed pollen on day number 218, and parent line B45 which shed on day 220.

Table 1

Day of 50 percent pollen shedding for the 10 x 10 corn diallel in 1972

	W64Aht ₁ B	Mo17	P254	SD9	SD12C	A641	WF9	Oh45	B45	W629A
W64Aht ₁ B	217	214	214	208	209	206	213	210	211	205
Mo17	212	218	210	209	207	207	211	210	216	205
P254	212	211	213	205	205	204	212	208	212	201
SD9	207	208	207	213	206	204	207	208	209	202
SD12C	207	211	206	207	213	203	210	207	213	203
A641	207	206	204	203	202	209	207	203	208	200
WF9	212	211	212	207	209	208	218	208	211	205
Oh45	209	210	208	207	206	204	208	214	212	202
B45	213	214	212	211	213	211	212	212	220	208
W629A	203	205	202	203	202	200	203	203	208	200
Mean	210	211	209	207	207	206	210	208	212	203

An analysis of variance of combining ability indicated that both general and specific combining ability effects were highly significant sources of variation. Reciprocal crosses were found to be dissimilar in their reactions. The analysis is summarized in Table 2.

Table 2

Analysis of variance of date of pollen shedding in 1972

Source	d.f.	m.s.
Total	269	
Replications	2	161.0
General combining ability	9	357.7**
Specific combining ability	35	8.5**
Maternal	9	3.0
Reciprocal	36	2.1*
Error	178	1.2

*P < .05

**P < .01

The statistical difference $W_r - V_r$ (B.I. Hayman, Genetics 39:789-809, 1954) was homogeneous over arrays (Table 3). This indicated that an additive-dominance model with independent gene distribution was adequate to explain the data. We therefore proceeded further with the analysis.

Table 3
Analysis of variance of W_r - V_r for date of pollen shedding

Source		d.f.	m.s.
Total		29	
	Replications	2	39.327
	Arrays	9	4.441
	Error	18	2.333

The dominance status of the parental lines was established by their relative positions along the regression line of W_r , V_r . There appeared to be no relationship between the dominance level and the actual date of maturity. A listing of the parents from most dominant to least dominant follows: A641, W629A, SD9, Oh45, B45, SD12C, WF9, W64Aht₁B, P254, and Mol7.

Theoretical genetic limits of maturity were obtained for each replication from the points in intersection of the regression line of W_r , V_r and the limiting parabolas. Table 4 shows that a recombination of this germ-plasm would permit the selection of inbred lines both earlier and later than those entering the diallel as parents.

Table 4
Limits of ranges of parental pollen shedding dates and estimated theoretical genetic limits in each of three replications

Statistic	Block I		Block II		Block III	
	Parent	Estimate	Parent	Estimate	Parent	Estimate
P_E	W629A	200	W629A	200	W629A	201
P_L	WF9	219	B45	221	B45	221
Y_E	----	189	----	185	----	196
Y_L	----	248	----	250	----	237

Both the additive and dominance components of genetic variation appeared to be substantial as judged by the relative magnitudes of their standard

errors. The components of variation are shown in Table 5 and some of the proportions of the components in Table 6.

Table 5

Components of variation for 50 percent pollen shedding in 1972

Component	Estimate	Standard error
D	31.8533	1.0847
F	4.3719	2.5027
H1	20.9500	2.3088
H2	18.9128	1.9622
LOWH2	114.8357	1.3134
D-H1	10.9034	1.9414
E	1.6212	0.3270

Table 6

Proportions of components of variation for 50 percent pollen shedding date in 1972

Proportion	Estimate
$(H1/D)^{1/2}$	0.8110
$H2/4H1$	0.2257
$[(4DH1)^{1/2} + F]/[(4DH1)^{1/2} - F]$	1.1849
LOWH2/H2	6.0719
Heritability (Crumpacker - Allard)	0.58

The mean degree of dominance was 0.81 or well within the partial dominance range. Although $H2/4H1$ was equal to 0.2257 and therefore suggestive of some asymmetry at loci showing dominance, the fact that H2 was not significantly different than H1 leads to the conclusion that the parents contain positive and negative genes in similar proportions.

The narrow sense heritability $h^2 = 0.58$ was sufficiently large

that the germplasm of the diallel should respond within a few cycles of mass selection.

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2. Measurement of pollen grain size in the diallel.

The same diallel used to study the inheritance of maturity was also used for an investigation of diameter of pollen grains. Bulk pollen samples from maturing plants in each plot were collected by tapping the tassels over a petri dish. The pollen was suspended in acetocarmine stain solution and examined with a light microscope. Diameters of at least 50 grains per plot with the grains randomly oriented in the microscope field were measured with an ocular micrometer. The data were analyzed in ocular micrometer units without transformation to metric scale.

A preliminary analysis of variance indicated highly significant differences among the parents for both general and specific combining ability effects. Also, the analysis of W_r, V_r indicated homogeneity of that statistic over arrays. However, upon proceeding further with the analysis it was evident that the genetic partitions of the components of variation did not differ significantly from zero. These components are shown in Table 7.

Table 7

Component	Estimate	Standard error
D	-0.2175	2.1563
F	-4.7487	4.9752
H1	2.7980	4.5899
H2	2.6978	3.9009
LOWH2	-0.5152	2.6111
D-H1	-3.0154	3.8595
E	4.2276	0.6501