Table 1

Averages of cold tolerance (CT) values of 21 opaque-2 and normal genotypes treated with 0.2% Quinolate V4X and the control

Type	Control	Treated with Quinolate V4X	Treated as % of control
Opaque-2	1.38	1.85	134.02
Normal	3.11	3.36	108.22
Opaque-2 as % of normal	44.37	55.06	

The results presented above seem to demonstrate that the o_2 gene alters the seed anatomy in such a way that the physiology of the kernel is greatly influenced. This might be due in part to a greater thickness of the pericarp in o_2 recessive homozygotes as was demonstrated in our earlier studies (Gupta and Kovács, 1973).

References:

Gupta, D. and I. Kovács (1973) Pericarp thickness in opaque-2 maize (Zea mays L.) and its normal analogue. Acta Agronomica 22: 400-405.

Herczegh, M. (1970) Some problems of cold tolerance. In: Some methodological achievements of the Hungarian hybrid maize breeding, pp. 271-281 (Kovács, I. ed.), Akadémiai Kiadó, Budapest.

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I. Kovács

2. A study on some characteristics of the heterozygous opaque-2 sister line crosses.

All of the parents of the opaque-2 heterozygote sister line crosses included here are of American origin, except for the line 156, which was developed by Dr. E. Pap from "Mindszentpusztai," a yellow dent improved open pollinated variety. Heterosis has been expressed as "heterosis index," which is a ratio of the observed value of the sister line hybrid to the average of its two parents.

Observations on some of the characters of the related normal and opaque-2 inbred lines and their $+/o_2$ heterozygote sister line hybrids have

Table 1

Studies on some properties of related normal and opaque inbred lines and their heterozygous opaque sister line crosses (Martonvásár, 1973)

Pedigree	Days to 50% male flowering	Moisture content %	Dry grain yield per plant g	1000 grain weight g	
				Normal	Opaque
C153 x W153 R o_2	75.0	18.1	88.4	245.2	231.7
C153	79.7	17.5	68.5	230.0	-
W153 R o_2	78.6	20.9	76.1	-	234.7
Heterosis index	94.8	94.3	122.3	105.5	99.7
W64 A x WF9 o_2	82.1	29.6	134.7	230.3	242.0
W64 A	85.2	24.7	89.6	195.6	-
WF9 o_2	87.8	38.0	64.8	-	238.4
Heterosis index	94.9	94.4	174.5	106.1	111.5
C123 x C123 o_2	82.1	28.2	125.0	226.3	221.0
C123	84.2	25.5	86.2	224.7	-
C123 o_2	86.5	33.3	63.0	-	209.1
Heterosis index	96.2	95.9	167.6	104.3	101.9
WF9 x WF9 o_2	84.4	31.1	96.9	218.3	223.4
WF9	87.1	27.5	58.6	191.0	-
WF9 o_2	87.8	38.0	64.8	-	227.7
Heterosis index	96.5	95.0	157.0	104.2	106.7
B14 x B14 o_2	86.7	36.8	71.1	259.5	238.0
B14	89.4	36.8	57.8	270.5	-
B14 o_2	87.2	39.6	53.3	-	245.7
Heterosis index	98.2	96.3	128.0	100.5	86.6
156 x 156 o_2	77.2	23.8	84.0	182.4	164.8
156	80.4	21.8	69.6	189.5	-
156 o_2	81.0	28.7	67.0	-	162.7
Heterosis index	95.7	94.2	123.0	103.7	93.6
Mean heterosis index	96.0	95.0	145.4	104.0	100.0

been presented in Table 1. There is a remarkable heterosis for earliness in the heterozygous hybrids as measured both by the days to 50% male flowering (96 percent of the parents) and the moisture content at harvest (95 percent). Further, it can be seen in Table 1 that there is a favorable heterosis for dry grain yield, the mean heterosis index of the hybrids being 145.4 percent of the parental lines. In other words the heterozygous hybrids demonstrate an average dry grain yield of 1.45 times that of their related opaque-2 and normal parental lines. Likewise, the 1000 grain weights demonstrate a considerable heterosis, at least for the normal grains (104%) obtained on these heterozygous hybrids.

On the basis of Mendel's law of segregation, such opaque-2 heterozygous hybrids are expected to yield a mixture of opaque and normal grains. The opaque grains are expected in the following ratios in the types of crosses mentioned below.

Possible combinations	Ratio of opaque grains
(W64A x WF9) x N6 o_2	25%
(W64A x WF9 o_2) x N6 o_2	50%
(W64A x WF9 o_2) x (A632 o_2 x A636 o_2)	50%
(W64A x WF9 o_2) x Opaque variety	50%

Breeding of such heterozygous opaque-2 hybrids is, thus, suggested as an alternative breeding procedure for developing modified opaque-2 hybrids.

I. Kovács

3. Comparison of some properties of the heterozygous opaque-2 hybrids and their normal analogues.

We studied the yielding ability as well as the earliness properties (days to 50% male flowering time and the moisture content) of the commercial hybrids 156 x N6 and 156 x B14 and their heterozygous opaque analogues. The results are summarized in Table 1.

Forty plants from each hybrid were examined individually for maturity and dry grain yield. From the Table 1 it can be stated that the values of two earliness properties, days to 50% male flowering and the moisture content at harvest, do not lead to the same conclusions in comparisons of the normal and the heterozygous opaque analogues. Data on flowering time