The ear position number is 1 for the lower ear on the stem. Even numbered ears, in a plant, are located on one side of the stem, the odd ones on the other. The ears segregating for the markers of the pollinating stock are classified as mutated. In some cases the mutation is limited to a sector of the ear.

From the reported data, the following conclusions may be drawn:

1) The treatment is effective in inducing mutations;
2) The frequency of ears showing mutations decreases with the ear insertion height;
3) When two or more ears in a plant are mutated, they are frequently located on the same side of the stem. This suggests a common origin of these ears from a single mutated cell line.

C. Lorenzoni
M. Pozzi
E. Ottaviano*

*Istituto di Genetica dell'Universita, Milano.

KRASNODAR RESEARCH INSTITUTE OF AGRICULTURE
Krasnodar-12, USSR

1. Changes in weight, protein and lysine content in opaque-2 kernels of corn during backcrossing.

Changes in weight in opaque-2 corn kernels as well as the changes in protein and lysine content were studied on segregating ears from selfed plants, phenotypically normal, but genotypically heterozygous. Studies were carried out in successive generations of backcrossing planted in one season. Segregation in every generation was considered on 7-10 selfed ears.

Lines A344, A198, Sg25, W155, Sg2, and WF9 were included in the experiments, and $\underline{o_2 ra_1 gl_1}$ and $\underline{o_2}$Syn A were included as opaque-2 gene sources having protein content of 9.75% and 11.0% and lysine content of 4.32% and 4.50%, respectively.

To eliminate possible size differences in kernels from top and bottom parts of the ears, adjacent translucent kernels up or down in the row were taken as controls. These two classes were weighed and

the mean weight of opaque-2 kernels was determined in per cent relative to the translucent kernels.

Protein content was determined on the whole kernel basis by the Kjeldahl micromethod. Lysine content in hydrolysates was determined by ion exchange chromatography on the Hitachi KLA-3B automatic amino acid analyzer. Each sample was a composite of several ears in each generation.

Weight depression rate of opaque-2 kernels in per cent of the normals during successive backcrossing is illustrated in Table 1. Weight reduction of opaque-2 kernels is significantly differentiated among the lines; e.g., in A344 it amounts to 24.2% while in WF9 it is only 6.6% in comparable BC3 generations. This confirms available data on differential reaction of separate line genotypes to the introduction of the opaque-2 gene.

Table 1. Depression rate in weight of opaque-2 kernels during various generations of backcrossing.
Weight of opaque-2 kernel expressed as per cent of normal weight.

Line	Backcross generation of a selfed plant				
	F_1	BC_1	BC_2	BC_3	BC_4
A 344	-	78.7	77.8	75.8(6)	72.2(7;9)
W 155	-	84.6	83.4	81.5(6)	79.3(7;9)
A 198	88.1	95.3	93.6(2)	89.1(3;6)	90.6(4;7;9)
Sg 2	82.9	91.0(1)	87.5(2;5)	89.7(3;6)	-
Sg 25	90.6	88.8	85.5(2)	89.5(3;8)	-
WF 9	91.1	93.6	93.7(2)	93.4(3)	-

Significant at P = 0.05

In parentheses:

Significant when comparing

(1) F_1-BC_1
(2) F_1-BC_2
(3) F_1-BC_3
(4) F_1-BC_4
(5) BC_1-BC_2
(6) BC_1-BC_3
(7) BC_1-BC_4
(8) BC_2-BC_3
(9) BC_2-BC_4
(10) BC_3-BC_4

Table 2. Protein and lysine content of opaque-2 kernels in successive generations of backcrossing

Line	Original line		Generation of selfed plants										Mean of generations to the original in %	
			F_1		BC_1		BC_2		BC_3		BC_4			
	Protein	Lysine	Protein	Lysine	Protein	Lysine	Protein	Lysine	Protein	Lysine	Protein	Lysine	Protein	Lysine
A 344	12.93	2.83	-	-	10.18	4.68	10.87	5.20	11.18	4.87	11.62	4.98	84.8	174.2
A 198	11.87	2.74	10.37	4.70	10.06	4.57	11.37	3.5	11.62	4.93	11.75	4.19	92.9	159.8
Sg-2	10.75	2.55	10.87	4.37	10.69	4.68	10.37	4.28	10.31	4.62	-	-	98.2	172.9
Sg-25	11.94	2.56	11.12	4.18	11.12	3.86	11.94	3.76	11.31	4.72	-	-	95.3	161.3
W-155	13.00	2.78	-	-	12.00	4.48	12.37	4.02	12.62	3.57	13.00	4.36	96.0	147.5
WF_9	11.06	2.78	13.06	4.34	12.12	4.36	11.18	4.64	10.81	4.05	-	-	106.6	156.0

There is a tendency in some lines toward augmentation of the depression rate in weight of opaque-2 kernels from lower to higher generations (A344, W155, Sg25), while in others the reduction is maintained at the same level (A198, Sg2, WF9). Thus, it may be suggested that there are differences in modifiers in some genotypes. Differences in depression rates were significant between non-adjacent backcross generations of the same line. These results suggest that the backcrossing line for which the opaque-2 counterpart is developed plays the primary role in determining the depression rate.

The protein content of opaque-2 kernels of backcross generations in all genotypes was somewhat lower than in the original lines. Significant differences were noted only for line A344 (Table 2).

In the course of backcrossing, the protein content in opaque-2 kernels comes close to the level of the original line. It may be concluded that the reduced protein content in opaque-2 kernels is not controlled by the specific activity of the o_2 gene but by the possible influence of the opaque-2 genotype source, by dominance of low protein content, and by reduction of protein content in hybrid F_1 compared with the parental lines.

The lysine content in opaque-2 kernels exceeds that in the original line by 47-74% (Table 2), and that is associated with the specific action of the opaque-2 gene and is not dependent on the protein level of the original line.

The lysine content in opaque-2 kernels of the same genotype changes very little through generations of backcrossing. In our material, the lysine content of the protein in opaque-2 kernels in various counterparts is only slightly different; however, it may be assumed that with a wider source of material, greater differences would have been found.

M. I. Hadjinov
K. I. Zima
A. A. Normov