Table 1

Crosses showing significant positive heterosis for various characters

Cross	Character	Percent increase over better parent
KT 41 X SP 1	--	--
KT 41 X SP 2	--	--
KT 41 X Pollo Segregaciones	Kernel rows	14.0
KT 41 X Chapalote	--	--
KT 41 X Nal-Tel (Yucatan 7)	--	--
Mexican June X SP 1	Ear length	14.0
Mexican June X SP 2	Days to silk	5.9*
Mexican June X Pollo Segregaciones	--	--
Mexican June X Chapalote	Days to silk Plant height Ear length	5.9* 10.6 19.0
Mexican June X Nal-Tel (Yucatan 7)	--	--

*This indicates earliness of the hybrid.

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5. Expression of the opaque-2 and floury-2 genes in the genetic background of the primitive and evolved maize varieties.

In order to assess the usefulness of the primitive varieties from the point of view of nutritional improvement of maize, an attempt has been made to study the expressivity of opaque-2 and floury-2 mutant genes in the genetic background of some of the primitive and evolved varieties. Crosses were made to incorporate the two mutant genes o_2 and fl_2 separately in SP 1 and SP 2 (Himalayan primitive varieties), Chapalote and Nal-Tel (Yucatan 7) (Mexican primitive varieties) and the evolved variety KT 41. After the first backcross with the wild type parent, the progeny was selfed and the mutant and non-mutant seeds sorted out from each ear. Protein, tryptophan and methionine was estimated in these kernels.

An estimate of nitrogen was made using the microkjeldahl method and multiplied by a factor 6.25 to obtain the protein content in corn (A.O.A.C., 1965). Tryptophan was analysed as per the method described by Hernandez and Bates (1969) after papain hydrolysis of the defatted corn flour. Methionine estimation was carried out colorimetrically as described by McCarthy and Paille (1959) after extraction with 2N HCl adopting the procedure given by Gupta and Das (1954). The observations are presented in Tables 1 and 2.

The observations in Table 1 show that the opaque-2 segregates from the different crosses differ in their protein content. In general, the segregates coming from crosses involving the primitive varieties as the non-opaque parent have a higher protein content compared to those in which the non-opaque parent is an improved variety. As regards the tryptophan content, the variation between segregates from different crosses, is not very marked. It is, however, observed that most of the segregates from crosses involving the primitive varieties have as much or more content of tryptophan than the segregates from crosses involving a non-opaque evolved variety. It can be concluded that the opaque-2 gene, when placed in the genetic background of the primitive varieties, expresses itself as well as or even better than when placed in the background of evolved types. It should, however, be emphasized that the mutant gene was not placed in a completely primitive or evolved background.

The observations presented in Table 2 show that the protein content of floury-2 segregates is slightly higher compared to the protein content of non-floury segregates obtained from the same ear. It is further observed that the methionine content in the floury-2 segregates from crosses involving the primitive varieties is, in general, higher than in similar segregates from crosses involving the evolved types. Thus, the floury-2 gene seems to express itself better, as far as methionine content is concerned, in the genetic background of primitive varieties. However, as far as the tryptophan content is concerned, the floury-2 segregates from different types of crosses do not differ much from each other.

Table 1

Protein and tryptophan content in opaque-2 segregates of primitive and evolved varieties, together with their content in non-opaque segregates from the same ear

Cross	Segre-gates	Protein (%)	Tryptophan g/100 g protein
[(SP 1 X $\underline{o}_2\underline{o}_2$) X SP 1] ⊗	$\underline{o}_2$	14.52	0.78
	+	14.98	0.50
[($\underline{o}_2\underline{o}_2$ X SP 1) X SP 1] ⊗	$\underline{o}_2$	13.96	0.89
	+	13.58	0.45
[(SP 2 X $\underline{o}_2\underline{o}_2$) X SP 2] ⊗	$\underline{o}_2$	16.71	0.88
	+	16.45	0.55
[($\underline{o}_2\underline{o}_2$ X SP 2) X SP 2] ⊗	$\underline{o}_2$	14.48	0.89
	+	14.22	0.42
[(Chapalote X $\underline{o}_2\underline{o}_2$) X Chapalote] ⊗	$\underline{o}_2$	13.47	0.82
	+	13.82	0.57
[($\underline{o}_2\underline{o}_2$ X Chapalote) X Chapalote] ⊗	$\underline{o}_2$	13.17	0.87
	+	13.27	0.56
[(Nal-Tel Y.7 X $\underline{o}_2\underline{o}_2$) X Nal-Tel Y.7] ⊗	$\underline{o}_2$	11.68	0.95
	+	11.82	0.44
[($\underline{o}_2\underline{o}_2$ X Nal-Tel Y.7) X Nal-Tel Y.7] ⊗	$\underline{o}_2$	13.31	0.66
	+	13.94	0.36
[(KT 41 X $\underline{o}_2\underline{o}_2$) X KT 41] ⊗	$\underline{o}_2$	13.41	0.83
	+	13.46	0.41
[($\underline{o}_2\underline{o}_2$ X KT 41) X KT 41] ⊗	$\underline{o}_2$	12.66	0.82
	+	13.30	0.31

Table 2

Protein, methionine and tryptophan content in floury-2 segregates of the primitive and evolved varieties, together with their content in non-floury segregates from the same ear

Cross	Segre-gates	Protein (%)	Methionine g/100 g protein	Tryptophan g/100 g protein
[($\underline{fl}_2\underline{fl}_2$ X SP 1) X SP 1] ⊗	$\underline{fl}_2$	15.31	2.69	0.58
	+	13.49	2.00	0.52
[($\underline{fl}_2\underline{fl}_2$ X SP 2) X SP 2] ⊗	$\underline{fl}_2$	14.24	2.79	0.73
	+	13.05	2.19	0.59
[($\underline{fl}_2\underline{fl}_2$ X Chapalote) X Chapalote] ⊗	$\underline{fl}_2$	16.68	2.85	0.83
	+	14.23	2.35	0.62
[($\underline{fl}_2\underline{fl}_2$ X Nal-Tel Y.7) X Nal-Tel Y.7] ⊗	$\underline{fl}_2$	13.84	2.91	0.75
	+	13.01	2.08	0.65
[($\underline{fl}_2\underline{fl}_2$ X KT 41) X KT 41] ⊗	$\underline{fl}_2$	14.45	2.53	0.76
	+	13.62	1.89	0.40

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