

Reference

Bhat, B. K. and N. L. Dhawan (1969) Effect of cytoplasm on quantitative characters of maize. Indian J. Genet. 29:321-326.

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3. Dominant genes in the evolution of maize.

Observations on a series of crosses involving primitive and evolved varieties of maize including SP 1 and SP 2 (Himalayan primitives), Chapalote, Nal-Tel (Yucatan 7), Pollo Segregaciones (Latin American primitives), KT 41 and Mexican June (evolved types) have shown that the genes determining early maturity, increased plant height, grain yield, ear length and the 1000 grain weight show a partial or complete expression of dominance in the first generation hybrids. The dominant genes were found to be contributed by the evolved varieties. It is generally believed that the primitive populations of a species show a greater concentration of wild type genes, and in the course of their evolution, they produce a large number of mutant alleles. Thus, the recessive genes are expected to show a greater preponderance in the evolved types. In the case of maize, many mutant genes having dominance effects have also been produced in the course of evolution. These mutant genes were obviously of great value and have been unconsciously or consciously selected by the early farmers and the present day plant breeders.

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4. Primitive and evolved varieties of maize and generation of heterosis.

A number of crosses between the primitive varieties of Himalayan and American distribution on the one hand, and highly evolved maize on the other, have provided evidence of a heterotic response. In the crosses between the primitive and evolved types, significant negative heterosis was more commonly generated when the Himalayan primitive varieties were involved as one of the parents. A significant positive heterosis for various characters of economic value was observed only in a few of the crosses, as shown in Table 1.

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	5.9*
	Plant height	10.6
	Ear length	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.