

Thus, the increase in number of aneuploids in the population on inbreeding probably has a somewhat negative effect, but its influence is not great enough to be responsible for a yield decrease of 45% in a selfed generation.

We may suppose that the main reasons conditioning a considerable reduction of yield and plant height in inbreeding of autotetraploid maize are likely genes with a series of multiple alleles involved in the expression of these characters and genes with a similar additive effect.

Probably various types of heterozygotes (simplex Aaaa, duplex - AAaa, triplex - AAAa) are not of the same value from the point of view of the maximum expression of heterosis. All these suppositions are to be checked.

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2. Meiosis in amphidiploid maize and teosinte.

Diploid hybrids of maize and teosinte developed by Emerson and Beadle usually showed a normal process of crossing over for marker genes (Emerson, R. A. and Beadle, G. W. Zeitschrift für Inductive Abstammungs- und Vererbungslehre 62:291-304, 1932).

Cytological studies showed normal chromosome pairing in these hybrids and only negligible variations in their length were determined (Longley, A. E., Bot. Rev. 7:263-289, 1941). The minor deviations in the process of meiosis manifested in some diploid hybrids are explained by the presence of small inverted segments of chromosomes in some teosinte forms.

The next logically based step in determination of the level of chromosome relationship and chromosome interaction is a hybrid tetraploid test.

To determine the level of homology of maize and teosinte chromosomes we crossed maize with the annual teosinte, E. Mexicana, from Chalco.

The 2-3 leaf seedlings were treated with colchicine by the method of 0.2% colchicine solution and 0.5% water soluble methylcellulose injection into the hollow formed by the leaves above the shoot apex.

Table 2

Number of plants	Number of examined cells	Occurrence of individual quadrivalent configurations										Number of bivalents	Trivalent + univalent number
		---	Y	X	⊙	⊙	⊙	◇	⊖	⊖	⊖		
6	300	0.022	0.016	0.100	0.009	0.114	0.046	0.245	0.238	0.029	0.057	0.120	0.004
						tetraploid maize							
1	50	0.062	0.032	0.042	0.022	0.100	0.068	0.232	0.170	0.044	0.056	0.168	0.004
						<u>Z. mays</u> x <u>E. mexicana</u> amphidiploid							
3	150	0.033	0.013	0.024	0.005	0.042	0.040	0.104	0.037	0.007	0.007	0.689	0.001
						<u>Z. mays</u> x <u>E. perennis</u> amphidiploid							

Young tassels of chimeric plants were fixed during the process of meiosis.

Simultaneously, we have crossed autotetraploid maize with the perennial teosinte, E. perennis.

A study of meiosis in autotetraploid maize and in both amphidiploids has been made in pollen mother cells prepared by the aceto-carmin squash technique. Individual chromosome configurations were scored according to Darlington (Darlington, C. D., J. Genet. 24:65-96, 1931).

As chromosome pairing in the maize amphidiploids and autotetraploids is mainly observed as quadrivalents and bivalents, we have classified only individual configurations of quadrivalents and the total number of bivalents neglecting their type.

The frequencies of the various types of association are given in table 2.

In the Z. mays x E. mexicana amphidiploid, the frequency of bivalent chromosome pairing rises from 0.120 (for a tetraploid maize) to 0.168. In addition, an increased frequency of quadrivalent associations with fewer chiasmata is also observed. This tendency is evidently expressed also in the Z. mays x E. perennis amphidiploid, where the frequency of bivalent pairing is 0.689. This is explained by extension of chiasma interference across the centromere (Shaver, D. L., Caryologia 15 (1), 1962).

As a result of involving a perennial teosinte in crosses with an autotetraploid maize a decrease of aneuploids in the population is expected.

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