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1. Effect of pollination condition on the expression of the gametophyte locus of chromosome 4.

For the past 50 years the gametophyte locus of the fourth chromosome has been the subject of a large number of reports, in particular those of American workers. This communication presents the results of studies carried out throughout 1969-1971 in the zone of northern subtropics along the coast of the Black Sea (Sochi, USSR). The sowing dates were from the end of March to the middle of July. Hybridisation was initiated from the second decade of June and was over by the third decade of September. One and the same F_1 hybrid between popcorn and sweet corn was sown in different years at different times. This made it possible to reveal the response of a definite genotype for the gametophyte locus to conditions prevailing during pollination. The analysis was carried out as described by Jimenez & Nelson (J. Heredity 56:259, 1965). F_1 hybrids of the $Ga^{s}Su/ga\ su$ genotype were used as testers. As a rule, three phenotypically different classes were distinguished in the course of the experiments. The classes correspond to three different genotypes of F_1 hybrids as follows:

Genotype of F_1 hybrids	Percentage of su in three types of crosses*			Phenotypical class
	⊗	♀	♂	
Ga Su/ga su	14	14	14	I
$Ga^{m}Su/ga\ su$	25	25	14	II
ga Su/ga su	25	25	25	III

*⊗ = self-pollination F_1 hybrids, ♀ = F_1 hybrid pollinated by tester pollen, ♂ = tester pollinated by F_1 hybrid pollen.

The method of analysis used does not differentiate Ga^{s} and Ga alleles and they produce a constant pattern of segregation corresponding to the first phenotypical class.

Table 1. Influence of pollination conditions on the results of the analysis of the F_1 hybrids

Hybrid	Pollination dates	Number of plants	♀		♂		Phenotypical class
			Total seed number	% su	Total seed number	% su	
Golden Bantam X Rice corn	September 1969	33	9687	26.64	7025	24.70	III
	June 1970	3	733	25.92	589	22.68	III
		6	1473	24.58	954	14.76	II
		10	2511	12.44	2508	13.51	I
	June 1971	15	4619	24.65	3088	23.30	III
	July 1971	8	2605	25.40	1347	10.25	II
		5	1469	23.78	1089	22.34	III
Golden Bantam x Globe White Shelled	September 1969	9	2019	25.92	2469	13.14	II
	June 1970	6	1499	14.14	1502	10.33	I
		3	1102	22.95	780	11.28	II
	June 1971	14	3177	25.13	3494	13.36	II
	July 1971	7	1861	23.15	1121	12.45	II
		5	1193	16.18	874	11.71	I
	September 1971	14	3182	26.15	3089	15.22	II
		2	371	23.62	408	21.87	III

Ga^m refers to the allele which combines the characters of the allele ga (when the F_1 hybrid containing this allele is used as the maternal plant) and the characters of the allele Ga (when the same plant is used as the source of pollen) (Genetika 6:14, 1970). Ga^m is widely distributed in popcorn maize populations (Genetika 8:2, 1972). The initial popcorn maize may be either homozygous or heterozygous for the gametophyte locus; if it is heterozygous, the F_1 hybrids are distributed into two phenotypical classes and if it is homozygous, the F_1 hybrids all belong to a single phenotypical class.

The results obtained in two F_1 hybrids after 4 and 5 repeated sowings of seed from one corn-cob are given in Table 1. Similar or very similar results have been additionally obtained in 23 F_1 hybrids. It should be noted that a part of the repeatedly sown hybrids were always assigned to the same phenotypical class.

Thus, the capacity of pollen tubes having Ga and Ga^m alleles to compete for the allele ga varies considerably depending on the pollination conditions. The environmental factors influencing the manifestation of the gametophyte locus were not analyzed.

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2. Analysis of the gametophyte allele Ga^m in F_2 hybrids.

The gametophyte allele Ga^m, as compared with the allele Ga, has the interesting feature of being active only in the male gametophyte. However, all the alleles of the gametophyte locus are highly variable, which makes difficult their identification and even makes their existence very questionable. An allelic test between the alleles Ga and Ga^m has been carried out earlier (Genetica 6:14, 1970). This is a report of the analysis of F_2 plants from the hybrid Golden Bantam x Globe White Shelled (see communication 1) and the analysis of the F_2 plants from hybrids of Ga Su/ga su genotype. This hybrid was used as tester in the preceding work. In addition to the analysis of genotypes obtained as a result of self-pollination of these F_2 hybrids, a similar analysis of hybrids produced by reciprocal crosses between two of the F_1 hybrids was carried out. The genotypes were identified by the method described in the preceding paper.