Only a few of the hybrid plants between maize and *Tripsacum* reached the flowering stage. They had 46 chromosomes. These were large, powerful, bushy plants. Some of them grew some years in greenhouse conditions. They were characterized by full male sterility and partial female fertility.

It has been ascertained also that if the maize has the color genes *A B Pl R*, hybrid kernels and hybrid plants have purple color. Possibly, *Tripsacum* has a gene analogous to the dominant maize gene *A1*. This fact allows the use of genetic markers for discovering apomicts among hybrids of maize and *Tripsacum*.

Megagametophyte investigation of tetraploid maize

--Kolesova, AJ

Tetraploid maize female gametophytes have not been investigated sufficiently. We carried out the analysis of 830 embryo sacs (*ES*) of tetraploid maize form *KrP-1* (population-1 from Krasnodar). *ES* of tetraploids, as a rule, had a structure typical for maize and consisted of a three-celled egg apparatus, the central cell with 2 polar nuclei or one central nucleus and antipodal complex. The characteristic peculiarity of tetraploids in comparison with diploids was the increase of cell, nucleus and, correspondingly, gametophyte sizes. Anomalous *ES* were discovered in 4 of 6 plants examined. The frequency of anomalous *ES* formation in tetraploids varied from 0% to 2.7%. In total, 12 anomalous *ES* were revealed. *ES* with additional polar nuclei (3-4 nuclei) and *ES* with anomalous position of polar nuclei prevailed. *ES* with egg-like synergids, and *ES* with additional nucleoli in the egg and polar nuclei were also discovered. In one ovule, the arrest of *ES* development at a one-celled stage was noted. In tetraploids, in contrast to diploids, the growth of antipodal complex cells was discovered. In one case, cells did not grow so considerably, increasing at a rate of 2-3 times. The structure and morphology of growing cells were similar to the rest of the antipodal cells. In other cases, antipodal complex cells grew considerably more, achieving 2/3 *ES* size. These growing cells were similar to central cells in their morphology. They contained large vacuoles and large nuclei, morphologically similar to polar nuclei. Growing cells always adjoined the antipodal complex. In most cases, growing cells were one-nuclear, and rarely two-nuclear. Cells with 3, 4, 6, 7, 8 and 13 nuclei were also discovered. More often, one cell, rarely two cells grew in the ovule. In one ovule, the growth of three cells was noted. The number of ovules with large growing cells varied from 3.4 to 26.4.

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Combining ability analysis for *turcicum* leaf blight (TLB) and other agronomic traits in maize (*Zea mays* L.) in the high altitude, temperate conditions of Kashmir

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Strategies for developing high-yielding cultivars resistant to *turcicum* leaf blight (TLB, *Exserohilum turcicum*; Northern Leaf blight) is one of the major objectives for our high altitude maize breeding programme. Primary breeding objectives also include: (1) earliness, due to the seasonal limitations of high altitude; (2) good performance under low moisture, critical when the temperature drops abruptly in the latter stages of crop growth; and (3) resistance to lodging, as determined by plant height and ear placement.

Three replications each of forty-five half diallel cross combinations were evaluated along with 10 parents (Table 1) at two locations, Larnoo and Khudwani, representing different altitudes with a temperate ecology. Each entry was sown in two 5 m length rows at a spacing of 60 cm. Plantings for each replication and location included 50 plants for each genotype (83333 per hectare basis). Days to 50 percent pollen shed and silking were determined on a plot basis. Plant height (cm), ear height (cm) and moisture content (%) were measured for five randomly selected plants. Grain yield (kg/plot) was adjusted to 14% moisture. The disease severity was recorded for five randomly selected plants from each plot for crosses and 10 plants for parents using a 1-9 rating scale based on the percent of the leaf area affected of adult plants: 0, 1, 10, 20, 30, 40, 60, 80 and >80 percent, respectively, per Payak and Sharma (In: Proc. Twenty Fourth Workshop of All India Coordinated Maize Improvement Project, IARI, New Delhi, 1981). Inoculations were prepared from infected leaf tissue from a farmer's field and made at the mid-silking stage. The first evaluations were made 15 days later, and thereafter, weekly for 4 weeks. Two leaves were evaluated, the ones immediately above and below the ear leaf, as these have impact on yield (Bowen and Pedersen, Plant Dis. 72:952-956, 1988). The percent disease index was calculated by using the formula suggested by McKinney (J. Agric. Res. 26:195-218, 1923). Combining ability analysis was carried out according to Model I, Method II of Griffing (Australian J. Biol. Sci. 9:463-493, 1956).

Table 1. Estimates of GCA effects for TLB and other agronomic traits in inbred lines in maize.

Parents	Pedigree	Disease severity	Grain yield	Days to 50% pollen shed	Days to 50% silking	Moisture content	Plant height	Ear placement
1	PMI-1	-1.52* (17.24)	0.29*	-1.56*	-1.64*	-0.22*	-0.14	-4.77**
2	PMI-26	-1.76** (17.24)	-0.03	-0.45**	-0.12	-0.76**	4.27**	-6.69**
3	PMI-47	-4.47** (19.89)	-0.04	0.06	0.35**	0.44**	6.04**	5.74**
4	PMI-53	2.32** (42.50)	0.26*	-0.10	-0.56**	0.19*	1.98**	-0.70**
5	PMI-83	0.61 (35.32)	-0.14	-0.21*	1.14**	-0.11	-1.01**	4.97**
6	PMI-135	1.38 (36.47)	-0.02	-1.37**	-0.97**	-0.05	8.56**	2.35**
7	PMI-198	2.56** (18.50)	0.05	1.76**	-1.64**	0.58**	1.62**	-3.98**
8	PMI-199	2.17** (40.77)	0.10	2.14**	1.43**	-0.16*	10.46**	1.66**
9	PMI-224	-1.85** (16.32)	0.25*	-0.02	-0.81**	-0.66**	15.02**	9.64**
10	PMI-401	2.48** (36.22)	0.43**	-4.00**	-2.41**	-1.48**	-34.37**	-9.62**
SE gi		0.43	0.11	0.06	0.05	0.08	0.10	0.10
SE gi-gj		0.58	0.17	0.09	0.08	0.13	0.15	0.15

Parents 1, 2, and 6 are indigenous; 9 is a local line; 3, 4, 5, 7, 8, and 10 are CIMMYT lines.
*, **significant at 5% and 1% level, respectively; parentheses (percentage disease score);