III. REPORTS FROM COOPERATORS

ACADEMY OF AGRICULTURAL SCIENCES OF BULGARIA
Sofia 13, Bulgaria
Institute of Genetics and Plant Breeding

1. A proposition for a new classification of maize lines according to their cytoplasm and rf-factors.

    Classification of this type is not known to us so far. On the basis of a study on the genotypes in 150 fertile lines, 70 sterile analogues and 33 fertility restorer analogue lines obtained on the basis of sterile T- or S-type of cytoplasm (T. Dankov, Dissertation, 1972) we propose the following classification, designation and short practical indication of all maize lines.

Table 1

Proposed designation of maize lines with various rf_1, rf_2 and rf_3 genotypes.

Name of the group	Genotype	Designation of cytoplasm					
		N	f st	T	f st	S	f st
Universal maintainer of Ts and Ss	$rf_1rf_1rf_2rf_2rf_3rf_3$	Num	f	Tum	st	Sum	st
First semi-restorer of Ts and maintainer of Ss	$Rf_1Rf_1rf_2rf_2rf_3rf_3$	NR1	f	TR1	st	SR1	st
Second semi-restorer of Ts and maintainer of Ss	$rf_1rf_1Rf_2Rf_2rf_3rf_3$	NR2	f	TR2	st	SR2	st
Full maintainer of Ts and restorer of Ss	$rf_1rf_1rf_2rf_2Rf_3Rf_3$	NR3	f	TR3	st	SR3	f
Full restorer of Ts and maintainer of Ss	$Rf_1Rf_1Rf_2Rf_2rf_3rf_3$	NR1-2	f	TR1-2	f	SR1-2	st
First semi-restorer of Ts and restorer of Ss	$Rf_1Rf_1rf_2rf_2Rf_3Rf_3$	NR1-3	f	TR1-3	st	SR1-3	f
Second semi-restorer of Ts and restorer of Ss	$rf_1rf_1Rf_2Rf_2Rf_3Rf_3$	NR2-3	f	TR2-3	st	SR2-3	f
Universal restorer of Ts and Ss	$Rf_1Rf_1Rf_2Rf_2Rf_3Rf_3$	NR1-2-3 f =NUR		TR1-2-3 f =TUR		SR1-2-3 f =SUR	

Eight principal genotypes according to rf-factors are the basis of the proposed classification. They may be on N-, T- and S-type of cytoplasm and they would show fertility or sterility depending on the relationships between the cytoplasm and the nucleus. The factors not designated in this short classification occur in recessive state.

This classification provides an indication of the type of cytoplasm and the state of rf-factors with every line and shows for what purpose it could be used in hybrid seed production on sterile basis.

<div align="right">Toma Dankov</div>

2. Elimination of hidden isolated heterozygous states of Rf-factors in sterile lines and single cross hybrids with the genotype $Trf_1rf_1rf_2rf_2$.

During the maintenance of the sterile lines 171, 144g, 0266a and Wf9 with the genotype $Trf_1rf_1rf_2rf_2$, fertile plants without vigorous growth appear systematically. The latter are due to mutation of the recessive factors rf_1 and rf_2 to the dominant factors Rf_1 and Rf_2.

The occurrence of fertile plants could not be eliminated by the method of analyzing crosses between individual plants of the sterile and the fertile analogue. In these analyses, not only the ideal genotypes $Trf_1rf_1rf_2rf_2 \times Nrf_1rf_1rf_2rf_2$ are considered pure but also the genotypes having single dominant factors are considered likewise since sterility occurs in them too, namely, $Trf_1rf_1rf_2rf_2 \times NRf_1rf_1rf_2rf_2$, $Trf_1rf_1rf_2rf_2 \times Nrf_1rf_1Rf_2rf_2$, $TRf_1rf_1rf_2rf_2 \times Nrf_1rf_1rf_2rf_2$, $Trf_1rf_1Rf_2rf_2 \times Nrf_1rf_1rf_2rf_2$, $TRf_1rf_1rf_2rf_2 \times NRf_1rf_1rf_2rf_2$ and $Trf_1rf_1Rf_2rf_2 \times Nrf_1rf_1Rf_2rf_2$.

However, in the next stage of the maintenance of the line, crosses between the following genotypes are possible also: $TRf_1rf_1rf_2rf_2 \times Nrf_1rf_1Rf_2rf_2$ and $Trf_1rf_1Rf_2rf_2 \times NRf_1rf_1rf_2rf_2$, and they produce fertile plants (25%) with the genotype $TRf_1rf_1Rf_2rf_2$ in the sterile analogue during the next year.

We succeeded in eliminating this undesirable phenomenon by selection of pure genotypes through analyzing crosses using two well differentiated testers with the genotypes $Rf_1Rf_1rf_2rf_2$ and $rf_1rf_1Rf_2Rf_2$, namely:

1. for cleaning of the fertile analogue:

$$TRf_1Rf_1rf_2rf_2 \times 1Nrf_1rf_1rf_2rf_2 = 100\% \text{ sterility}$$
$$Trf_1rf_1Rf_2Rf_2 \times 1Nrf_1rf_1rf_2rf_2 = 100\% \text{ sterility}$$