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Phenotypic characterization of inbred lines and their o2 conversions

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--Scott, MP

Peter Loesh was a plant breeder at Iowa State University from 1971 to 1980. During this time, he worked extensively with the *o2* mutation in an effort to improve the nutritional quality of maize. Unfortunately, he passed away suddenly, and this work was not brought to a conclusion. Some of his effort was devoted to developing *o2* back-cross conversions of public domain inbred lines. Because Dr. Loesh's field books have been lost, the extent of recovery of the recurrent parent phenotype is not known.

The objective of this study was to characterize Dr. Loesh's *o2* converted lines relative to their recurrent parents and to verify that they have the *o2* genotype. To accomplish this, I planted one row of each line adjacent to one row of the corresponding recurrent parent at the Iowa State University Agronomy Farm in the summer of 2001. The resulting plants were characterized phenotypically on the basis of their plant height, ear height and pollination date (see Table). With the exceptions noted in the table, the inbreds were phenotypically similar to their recurrent parents.

In order to verify that the Loesh inbreds carried the *o2* mutation, each of these lines was crossed to an *o2* mutant tester from the Maize Co-op Stock Center (701D). In all cases, the *o2* genotype was confirmed.

These lines will be valuable for comparing the effect of different genetic backgrounds on the *o2* mutation, and may also be useful to breeding programs aimed at improving nutritional quality with the *o2* mutation. Seed of these lines has been sent to the Maize Co-op Stock Center for maintenance and distribution.

Table. Phenotypic characterization of inbred lines and their *o2* conversions.

Pedigree	plt ht[a]	ear ht	pol date[b]	comments
A257	NS	NS	-1	
A619	* *	NS	-3	
B14A	* *	NS	-2	*o2* small kernels
B45	NS	*	0	
B46	*	NS	2	*O2* red cob, *o2* white cob
B57	NS	NS	-6	
B66	NS	NS	0	
M14	NS	*	-9	

[a]Plant and ear height measurements are the average of the first five plants in the row. NS indicates the difference between the inbred line and its *o2* conversion is not significant, ** significant to P=0.05, * significant to P=0.1

[b]Pollen date = (number of days after planting when half the plants in the *O2* row first shed pollen) – (number of days after planting when half the plants in the *o2* row first shed pollen)

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Common and different band for isozyme of the multiplasmic lines in maize (Zea mays L.)

--Zeng, M, Yang, T

The term "multiplasm" was originally introduced into the research of CMS (cytoplasmic male sterility) by Grogan (1971). At the present time, "multiplasm" in the broad sense generally indicates a set of genetic materials: a homonucleo-hetero cytoplasmic line, a homocytoplasm-hetero nucleus line and different lines for single, double, multiple genes, including isogenic and near-isogenic lines. Multiplasm in a narrow sense indicates only the genetic material (line) of homeonucleo-hetero cytoplasm. Breeding for a multiplasmic line, has not only provided a new model of investigation into the genetics of cytoplasmic and nuclear genes and nucleoplasmic genetic interactions, but also has provided a fresh channel for avoiding a single cytoplasmic resource in germplasm and has increased the diversity of germplasm resource in crop production. This study surveys the isozymic band by electrophoresis.

Eleven multiplasmic lines of maize were used as experimental materials, i.e. (Fli) Mo17 [original Mo17 line, (Fli) was shown as flint cytoplasm], (su1)Mo17, (sh2)Mo17, (bt1)Mo17, (Pop)Mo17, (wx)Mo17, (Teo)Mo17, (cms-T)Mo17, (cms-S)Mo17, (cms-C)Mo17, (cms-21A)Mo17. (Fli)Mo17 was used as a control (CK) to carry out the analyses. The common degree of nuclear genes was 99.95% in 10 of the multiplasmic lines.

Isozymes were determined as described by Zeng (Determinations of the biochemistry for CMS and genetics for their restoration in maize. Science in China, 25(3):283~296, 1987). The electrophoreses were conducted analyzing the POD and EST of kernel at the 9th day after pollination, embryo at the 15th, 25th, and 34th day after pollination, endosperm at the 15th, 25th, and 34th day after pollination, and young shoot of mature seed, unfolded leaf at the 6-leaf, 8-leaf, and 14-leaf stage, emergent tassel stage, pollination stage, 15th day after pollination, and tassel at emergent tassel, and pollen at pollination stage, respectively.

Experimental Results. The results obtained indicate there were 20 POD bands, and 18 EST bands in total. Comparing the 11 multiplasmic lines, the zymograms for POD electrophoresis of the

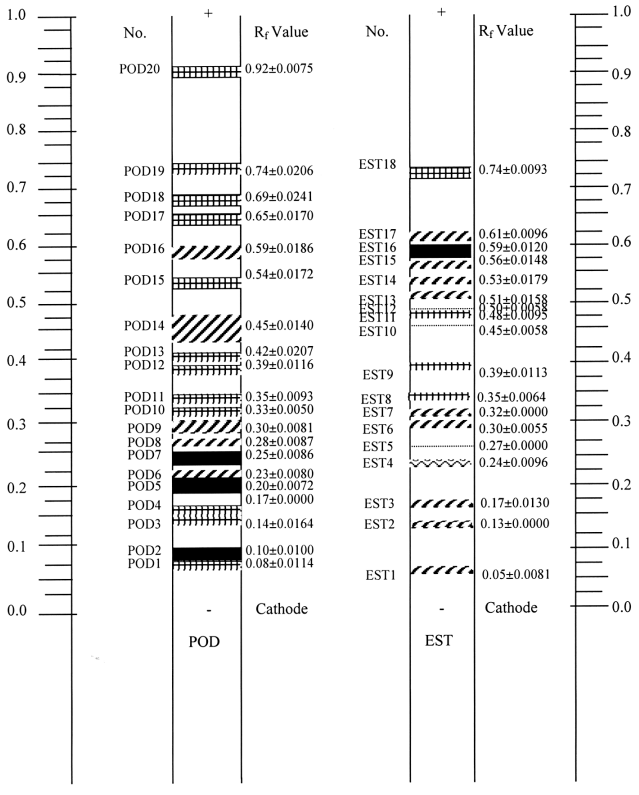

Figure 1 Zymograms of peroxidaes and esterase isozyme in multiplasms
The following order is one of the increasing activities of isozymic bands.