GENETIC STUDIES IN A NOVEL OPAQUE ENDOSPERM MUTANT DERIVED FROM INDIAN MAIZE GENOTYPES

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Key works: *opaque-2*, endosperm, grain hardness.

Indian maize genotypes from South America have been characterized as a novel class of opaque endosperm mutant once, in addition of the soft endosperm, they also have normal levels of zeins fractions and low protein quality in the kernels. In other hand, the opaque mutants described in the literature have in general higher nutritional quality and lower zein levels compared to the wild type genotypes. So, the endosperm attributes displayed by the Indian maize genotypes has not been described. As the opaque mutants in maize are an important source of genetic variability, this work was carried out to further investigate the genetic aspects affecting the endosperm characteristics in these Indian maize genotypes. The zein fractions were evaluated using SDS-PAGE, isoeletric focusing (IEF) and bidimensional electrophoresis gels. The SDS-PAGE showed normal levels of zeins in the Indian genotypes, however, the IEF gel detected a cationic isoform (pI 8.0) present in nine of the ten Indian maize and absent from the normal and QPM (modified *opaque-2*) maize genotypes. From the bidimensional gels, the cationic isoform, presented in the Indian genotype Bol-II did not revealed any different polypeptides compared to the normal and modified *opaque-2* genotypes, indicating that the proteins had the same molecular mass as the other zeins, but a different net charge. The Bol-II, also displayed a 14 KDa zein with a different pI from the other genotypes. A population of 48 F_2 individuals derived from a cross between the Indian maize Bol-II and a normal line Cateto $L_{237/67}$ was used to map the opaque-endosperm phenotype. Approximately 300 SSR primers were screened against the two contrasting bulks for the endosperm phenotype, and the polymorphisms of interest were applied in the whole population. The opaque endosperm phenotype was mapped in the short arm of maize chromosome 2 (between the bins 2.02 and 2.04), in the region where are located the mutations *opaque-8* and *floury-1*, also conferring opaque endosperm in maize. Linear regression analysis confirmed the map position, once both markers flanking the opaque phenotype were maintained in the multiple regression model, explaining 43.2% of the phenotypic variation. As both mutations increase the lysine and tryptophan contents when compared to normal kernels, the Indian maize genotypes may have different genetic factors affecting the expression of these aminoacids. Interestingly, most of the Indian genotypes have the *opaque-2* allele in homozygosis or in heterozygosis, while some of these genotypes have a different *opaque-2* allele. All these data suggest that the Indian maize genotypes may be included as a novel class of mutants, which can contribute to better understand the relationships among hardness, zein levels and nutritional quality in maize endosperm.

Financial Support: PRONEX, IAEA, CNPq.