Mexican maize genetic diversity with necessity of being preserved under the eventual introduction of transgenic varieties

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Mexico is the center of origin and large genetic diversity of maize can be found there; such diversity needs to be thoroughly assessed and preserved under the eventual introduction of transgenic maize varieties. These assessments of diversity could help in designing appropriate schemes of breeding and conservation. In this context, the present study was aimed to 1) generate a genetic fingerprint for races of Mexican maize using DNA microsatellites, 2) to compile and characterize the universe of existing alleles in Mexican races of maize, and 3) to estimate genetic diversity. Six hundred eight accessions belonging to 59 Mexican races of maize were characterized; DNA from 25 individuals per accession was extracted and characterized using 31 microsatellite loci. Results indicated that Mexican maize has exceptional allelic richness (total of 863 alleles, for an average of 27.8 alleles per locus). The vast majority are rare alleles, as 84.2% of those were present at frequencies of less than 5.0%. Parameters of genetic diversity, as the number of alleles per locus, expected heterozygosity and percentage of polymorphic loci were higher than those found in previous studies. Overall, the Mexican races of maize have high genetic differentiation; genetic diversity within populations represented 76% and that among populations 24%, suggesting high rates of gene flow. It was possible to visualize and confirm the clustering of populations of Mexican maize into races by their genetic profile, showing high correspondence between genetic proximity and geographic distribution patterns. In the present study, we distinguished 59 races of maize in Mexico, but that figure might move upward since there was no available seed from gene banks for some putative races. It is concluded that the Mexican races of maize constitute a valuable gene pool and a cornerstone for food security for that country and ultimately to the world, that needs to be protected and utilized as a genetic resource.

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