

Quantitative evaluation of genetic erosion in wheat germplasm using molecular markers

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ABSTRACT

Characterization of germplasm using DNA fingerprinting techniques provides quantitative estimates of genetic diversity and the information required for a rational utilization of germplasm in breeding programs. In this study, 105 Argentine cultivars of bread wheat (*Triticum aestivum* L.) released between 1932 and 1995 were characterized using SSR and AFLP markers. A selected subset of ten highly informative microsatellites was used to construct an Identification Matrix that allowed the discrimination of all the cultivars included in this study. Data obtained from SSR markers was complemented by information derived from AFLPs to evaluate genetic relationships among cultivars. The correlation between a combined SSR and AFLP similarity matrix and a kinship coefficients matrix was low ($r = 0.34$) but highly significant (Mantel test, $P < 0.01$). Molecular data were used to quantify genetic diversity across the wheat breeding programs and to evaluate genetic erosion. No significant differences in genetic diversity were found between the largest private and public breeding programs. Significant differences were found only between the large and smallest breeding programs for both SSR and AFLP. An interesting result from this study was that no significant differences in genetic diversity were found between the group of cultivars released before 1960 and those released in each of the following three decades. Average diversity values based on SSR markers were almost identical for the four analyzed periods. Genetic diversity estimates based on AFLP data were also very similar but slightly significant differences were found between bread wheat cultivars released in the 70's (PIC= 0.28) and those released in the 80's (PIC= 0.34). These results contradict the general vision of significant genetic erosion in modern cultivars and show that the Argentine bread wheat germplasm has maintained a relatively constant level of genetic diversity during the last half century.