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Development and Characterization of Microsatellite Markers for the Grain Amaranths [Abstract]

The grain amaranths (*Amaranthus hypochondriacus* L., *A. cruentus* L., and *A. caudatus* L.) are important pseudo-cereals native to the Americas. The objective of this project was to produce and characterize a set of highly informative, reproducible microsatellite markers for the grain amaranths. A total of 1457 clones were sequenced from three microsatellite-enriched libraries. Of these, 353 contained unique microsatellites. An additional 29 microsatellite loci were identified from 728 bacterial artificial chromosome–end sequences. A total of 179 microsatellites were polymorphic across accessions from the three grain amaranths. Among these polymorphic microsatellite loci, a total of 731 alleles were identified with an average of four alleles per locus. Heterozygosity values ranged from 0.14 to 0.83, with a mean value of 0.62. Thirty-seven (21%) of the markers were polymorphic between the parents of a segregating population. Phylogenetic analysis using the marker data placed *A. hybridus* L. accessions into two of the three grain amaranth clades, suggesting the polyphyletic evolution of the three cultivated species from different *A. hybridus* ancestors. The transferability of these markers to *A. hybridus*, *A. powellii* S. Wats., and *A. retroflexus* L. is reported and suggests that these markers may be useful in studying other species within the genus *Amaranthus*, including several economically important weeds and ornamentals.