

The World Vegetable Center *Amaranthus* Core collections

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Abstract

The World Vegetable Center harbors Africa's largest amaranth (*Amaranthus* spp.) collection in its genebank in Tanzania. The collection currently includes over 1,000 accessions of 18 *Amaranthus* species, too many for breeders to evaluate. A smaller number of biodiverse accessions (core collection) would be more amenable for germplasm characterization and screening for favorable traits and subsequent mobilizing crop diversity for breeding and selection. WorldVeg has developed two core collections for amaranth, one representing the diversity of the whole collection, and another one containing only the four *Amaranthus* species with greatest importance for vegetable production in Africa (African core, consisting of *A. cruentus*, *A. hypochondriacus*, *A. caudatus* and *A. dubius* accessions). The core collections were chosen from the whole collection based on diversity analysis using high throughput genotypic data. Comparing the Shannon Index and Nei's expected heterozygosity between the whole and the core collections demonstrated that the diversity of the whole collection was maintained to at least 90% on the genomics level. The diversity of nine quantitative traits was conserved to about 80% in the core collections compared to the whole collection. Agronomic evaluation and drought stress tolerance screening in the African core demonstrated important variation in leaf yield under stress as well as non-stress conditions and accessions with favorable traits are forwarded to amaranth breeding programs.