Bioactive Compounds in Brazilian Capsicum Species Germplasm

Bioactive compounds in pepper are associated with several health benefits. While consumers are looking for foods more nutritionally and functionally rich, growers want high-yielding cultivars with improved stress tolerance. Breeders must take both requirements into consideration when developing cultivars. Germplasm collections are essential to preserve genetic diversity and support breeding efforts; however, they must be properly characterized to be useful to breeders.

In an article recently published in Crop Science, researchers report the chemical characterization of pepper accessions from a Brazilian germplasm collection. Seventy-two accessions of Capsicum annuum, C. baccatum, C. chinense, and C. frutescens were evaluated. High variability in soluble solids, pH, acidity, fruit color, antioxidant potential, and phenolic, carotenoid, and capsaicinoid contents was observed in accessions evaluated. No one accession contained high levels of multiple bioactive compounds.

The optimized extraction protocol for capsaicinoid analysis was quick and simple, and the quantification method by high-performance liquid chromatography-fluorescence detector (HPLC-FLD) showed low detection and quantitation limits and high reproducibility. Analysis using ultra-high performance liquid chromatography quadrupole time-of-flight mass spectrometry (UHPLC-QTOF-MS) allowed for unequivocal confirmation of quantified capsaicinoids and identification of minor capsaicinoids.

Results identified superior accessions in the Embrapa Temperate Agriculture Capsicum germplasm collection for use in breeding efforts guided not only by agronomic characteristics but also by fruit bioactive composition.


Wheat Regional Trials Define Agro-Ecologic Production Zones

USDA-ARS coordinates the region-wide testing of advanced experimental breeding lines of wheat and other crop plants. Through these cooperative programs, data on agronomic performance and adaptation, disease resistance, and grain quality traits are obtained over a far wider geographic region than any one breeding program can achieve alone. These data have been used to identify wheat “production zones” or agro-ecological regions that define the optimal area of adaptation for new cultivars.

In an article recently published in Crop Science, a researcher from the USDA reported the repetition of an analysis conducted in 1992, using subsequent years’ data, to determine whether previously established wheat production zones, based on grain yield performance and its correlation between sites, were still valid.

Results showed performance in regional nursery trials can still be used to identify production zones, and that these production zones could be partially predicted by natural vegetative formations. Response to the well-described precipitation gradient across the Great Plains is the primary factor governing wheat breeding line performance and adaptation.

Wheat breeding programs and growers may continue to use the production zones established via the USDA-ARS coordinated winter wheat regional nurseries to target optimal areas of cultivar adaptation and select germplasm for crossing programs.

Adapted from Graybosch, R.A. 2017. Similarities among test sites based on the performance of advanced breeding lines in the Great Plains Hard Winter Wheat Region. Crop Sci. 57. View the full article online at http://dx.doi.org/doi:10.2135/cropsci2016.08.0708

Locations defining the Southern Regional Performance Nursery Northwest wheat production zone. The size of the circle is proportional to the accuracy of a location at forecasting performance throughout this zone.