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ESTABLISHING AND CHARACTERIZING A CAPSICUM ANNUUM MAGIC POPULATION: PHENOTYPIC AND GENOMIC INSIGHTS

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The increasing global demand for enhanced agricultural productivity requires the use and development of cutting-edge breeding strategies that efficiently exploit the wide array of plant genetic resources, paving the way for sustainable progress. To address this need, the use of Multi-parent Advanced Generation Inter-Cross (MAGIC) populations has emerged as a promising approach. These populations are made of recombinant inbred lines (RILs) generated from multiple founder parents, resulting in a genetic mosaic with exceptional diversity. In our research, we focused on the development of a new pepper (*Capsicum annuum* L.) MAGIC population by selecting eight accessions as founder parents, which are characterized by distinct phenotypic and genetic attributes. Whole-genome resequencing on these parental lines was performed at 25x, and their morpho-agronomic properties were assessed by investigating 23 key agronomic descriptors. By using the high-quality genome of the line "Ca_59" recently published (Liao et al., 2022; Nat Commun 13, 3479), we successfully identified approximately 15 million high-reliable polymorphisms, including ~14.4M (94.9%) single nsucleotide polymorphisms (SNPs) and ~0.7M (5.1%) InDels. The detailed morpho-agronomic and genetic characterization of these selected accessions holds great significance in facilitating the genetic analysis of the pepper MAGIC population. Furthermore, the obtained results provide valuable knowledge and resources to the pepper research community, empowering genetic and genomic studies, as well as supporting targeted breeding efforts to enhance pepper cultivars