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New PeanutMAGIC population provides high diversity and increased recombination events

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Development of a multiparent advanced generation inter-cross population of peanut (PeanutMAGIC). Advancing an eight-way F1 hybrid to produce F2 seeds (A). The F1 seeds individually planted with an alternating border of Georgia-06G, a popular commercial variety (B).

Cultivated peanut (*Arachis hypogaea* L.) presents various challenges to peanut researchers because of its narrow genetic diversity and increased susceptibility to biotic and abiotic stresses. To address this issue, researchers developed a peanut multiparent advanced generation inter-cross (MAGIC) population, named PeanutMAGIC. PeanutMAGIC increases the potential recombination and diversity within each offspring through multiple generations of intercrossing hybrids of different founders. The population is derived from eight diverse peanut cultivars and breeding lines and has 3,187 recombinant inbred lines.

Scientists from USDA-ARS, the University of Georgia, and the HudsonAlpha Institute for Biotechnology in Huntsville, AL genotyped a subset of 310 lines of PeanutMAGIC using whole-genome sequencing and conducted two-year phenotyping. Whole-genome characterization of the subset, known as MAGIC Core, demonstrated that PeanutMAGIC harbors a balanced and evenly differentiated mosaic of genomic blocks from eight founders, providing unique recombination events for high-resolution mapping of quantitative traits.

The PeanutMAGIC population can be used by peanut researchers as a new resource for genetic and genomic studies and for cultivar improvement, the team concludes. Small seed lots of PeanutMAGIC and MAGIC Core are available for research and breeding purposes.

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