Genomic study illuminates mango's heritage and future

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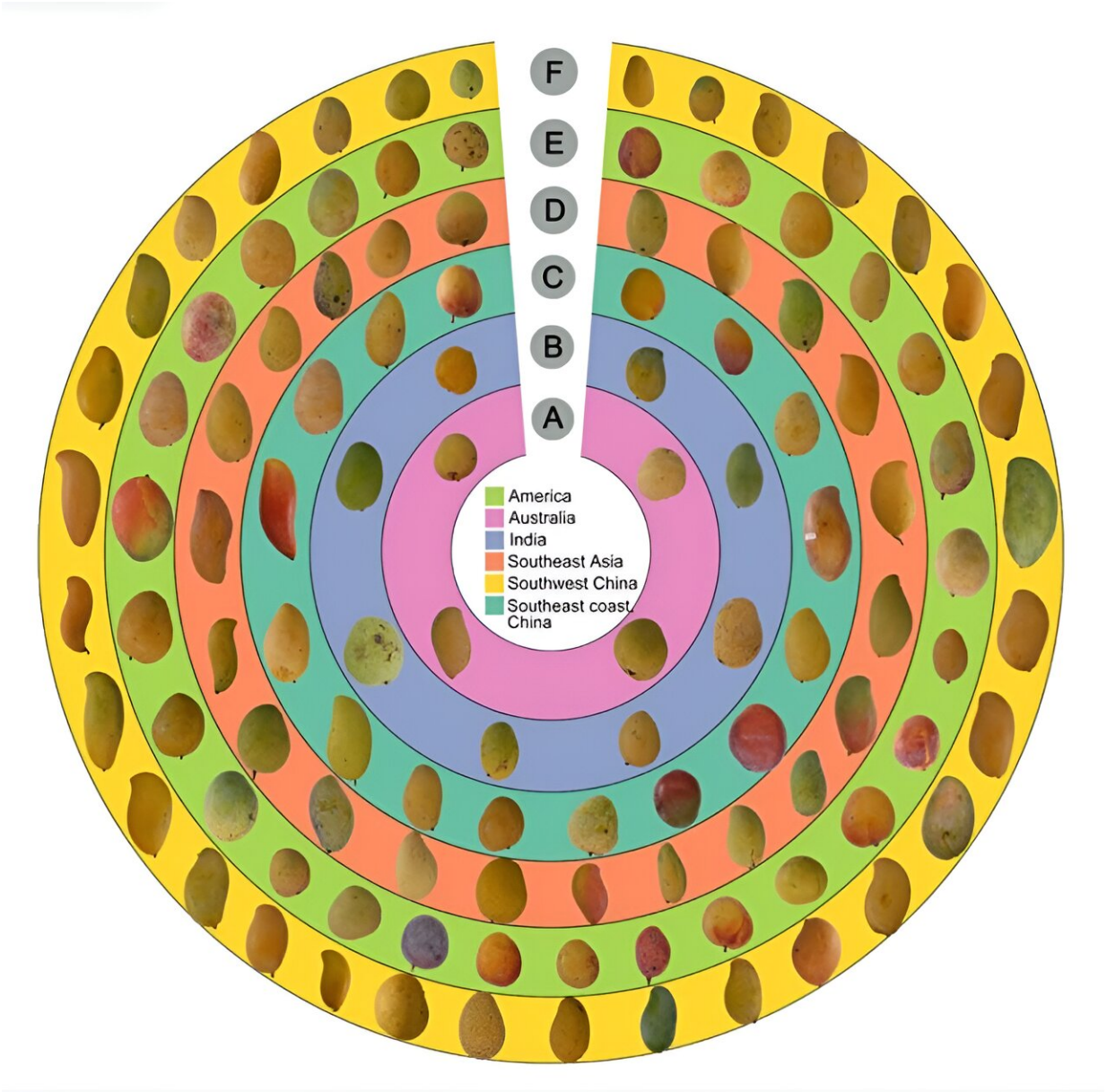

Fruit features and genome-wide variant calling of mango accessions. a Representative fruits sampled from various geographical regions. Credit: *Horticulture Research* (2024). DOI: 10.1093/hr/uhae153

Mango, a tropical fruit with a long cultivation history, faces significant challenges such as low genetic diversity and limited breeding improvements due to complex domestication and self-pollination. These issues hinder genetic advancements in traits like yield, size, and quality.

To address these challenges, an in-depth exploration of mango's genetic resources is crucial for enhancing key traits. This study provides a comprehensive analysis of mango genetic diversity, targeting breeding improvements.

Published in *Horticulture Research*, the study was conducted by an international research team, examining genetic diversity, population structure, and genome-wide associations in mango (Mangifera indica). By re-sequencing 224 accessions from 22 countries, the research reveals genetic differentiation and identifies loci associated with flowering, fruit weight, and aroma compounds, offering new insights for future breeding efforts.

The study used whole-genome re-sequencing to assess genetic variation in 224 mango accessions, spanning wild and cultivated varieties. Genome-wide association studies (GWAS) pinpointed loci linked to traits such as flowering capability, fruit weight, and volatile compounds.

Unique genetic ecotypes within Chinese mango accessions were uncovered, reflecting distinct evolutionary pathways shaped by geography. Key findings include identifying genes involved in flower development and aroma biosynthesis, providing valuable markers for

breeding programs focused on enhancing yield and quality, addressing low genetic diversity, and improving mango varieties' agronomic performance.

"This research marks a major advance in decoding the complex genetics of mango," said Dr. Wentian Xu, a senior author of the study. "Identifying the genetic basis of key traits paves the way for new breeding strategies, enabling us to develop varieties with better yield and quality, tailored to consumer preferences."

The findings hold significant promise for mango breeding and cultivation. Identifying genetic markers linked to desirable traits allows breeders to create new mango varieties with enhanced flowering, larger fruit size, and improved aroma. These improvements will meet growing market demands and promote sustainable cultivation.

The genetic data also lay the groundwork for future studies, including the potential use of gene editing for targeted crop enhancements.

More information: Xiaowei Ma et al, Genomic diversity, population structure, and genome-wide association reveal genetic differentiation and trait improvements in mango, *Horticulture Research* (2024). DOI: 10.1093/hr/uhae153

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