Global *Coffea Arabica* Genetic Improvement Research Priorities, 2023

BACKGROUND

Without significant gains in genetic improvement, the coffee sector will not be able to keep up with growing consumer demand and respond to the challenges of climate change across diverse origins. But decades of severe underinvestment in coffee agricultural R&D has created an anemic innovation ecosystem for coffee genetic improvement. The result is that breeding programs lack basic tools to increase the efficiency of arabica breeding.

National coffee research institutions in key coffee producing countries, as well as the coffee industry (via World Coffee Research and private sector efforts) have ongoing investments in coffee breeding. But there is an exciting role for the international scientific community to advance knowledge of arabica genetics and build tools that will assist arabica coffee breeding programs around the world to accelerate genetic gain and develop robust breeding pipelines to secure the future of the world's favorite beverage.

This research priority list for 2023 identifies the top needs of the global coffee breeding community to accelerate genetic improvement in *Coffea arabica*. For the international scientific community as it develops grant applications for research opportunities, and for those enthusiastic to contribute to the challenges of coffee, we've generated a list of key priorities to help focus the community on key technology needs to support global breeding efforts.

RESEARCH PRIORITY LIST

- Identify new sources of pest and disease resistance, especially Coffee Leaf Rust, Coffee Berry Disease and Coffee Berry Borer
- Identify new sources and basis of tolerance to abiotic stressors such as high temperature and drought
- Develop genetic markers for disease resistance
- Develop genetic markers for complex/multigenic traits such as cup quality
- Develop tools and methodologies for increasing the efficiency and throughput of phenotypic selection
- Develop affordable, high density genotyping for association mapping
- Develop inter- or intra-specific mapping populations
- Understand genotype x environment x crop management interactions, such as shaded vs. full sun production, low input vs. high input production, F1 hybrid vs. inbred varieties, rootstock/scion
- Develop tools and methodologies to decrease breeding cycle time, for example double haploids, speed breeding
- Develop tools for disease surveillance and forecasting
- Breeding improved rootstock materials
- Develop methodologies to improve the efficiency of vegetative propagation
- Develop high-performing male-sterile lines for the production of F1 hybrid varieties

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