Coffee Research Priorities to Support Breeding and Variety Development, 2026

BACKGROUND

This research priority list for 2026 identifies the top needs of the global coffee breeding community to accelerate genetic improvement in coffee. It includes the highest priority issues and collaborative research opportunities within the context of breeding generated from group discussions at the Innovea Breeders Workshop in Colombia in November 2025.

1. DISEASE RESISTANCE

- **Genetic markers.** Develop genetic markers for disease resistance especially mapping populations segregating for resistance.
- **Standardized screening**. Development of standardized approaches, imaging and AI tools to identify and measure pest and disease severity.
- **Emerging pathogens.** Moving beyond Coffee Leaf Rust (CLR) and Coffee Berry Borer (CBB) to identify and prepare for future threats such as fungi, bacteria, phytoplasmas, and insect species (e.g., Coffee Wilt Disease, Anthracnosis/CBD/ Coffee fruit rot), Mealy bug (*Pseudococcidae spp*) and root-knot nematodes, Cercospora leaf spots/red blister disease, Black Coffee Twig Borer (Xylosandros)).
- **New sources of resistance.** Identifying new sources of pest and disease resistance, and introducing into breeding pipelines (e.g., using QTL mapping, gene editing, interspecific crosses).
- **Pathogen evolution.** Understand how pathogens are evolving and host-pathogen interactions are affected by a changing climate.
- **Surveillance platform.** Developing a shared platform for exchanging real-time information on pest and disease mapping and incidence across different regions.

2. CLIMATE RESILIENCE AND ABIOTIC STRESS

- **Understanding climate and stress response.** Understanding how coffee responds to climate change and developing methods to evaluate, particularly under combined stress (e.g., heat + drought + pathogen/pest pressure) and future-modelling scenarios. Could include systematic evaluation of genotype x environment interactions across climatic gradients.
- **Integration of climate resilience traits into breeding pipelines**. Identifying sources of beneficial variation in traits such as drought and heat tolerance and utilizing inter-specific, wide crosses or other approaches to introduce these variations into breeding populations.
- **Root performance.** Understanding root architecture and performance in uptake of water and nutrients and implementing strategies (for example grafting or breeding for nutrient uptake efficiency) that mitigate abiotic stress.
- **Agroforestry adaptation.** Characterization of carbon sequestration and other environmental and economic performance metrics of agroforestry production systems and breeding for improved performance within these systems.

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3. LABOR AND PRODUCTION EFFICIENCY

- **Labor efficiency.** Breeding for synchronized flowering, uniform ripening, and improved plant architecture to allow for more efficient management of human harvest labour.
- **Mechanization compatibility.** Improving plant architecture, physiology, and/or fruit maturation timing to improve compatibility with mechanized tools and automation.

4. OTHER RESEARCH TO SUPPORT BREEDING GOALS

- **Early selection tools.** Use of molecular markers and mid to high throughput phenotyping tools to improve selection efficiency and reduce breeding timelines.
- **Cup quality tools and approaches.** Development of spectroscopic and other tools for evaluating and breeding for coffee quality.
- **Propagation and distribution.** Approaches to improve the efficiency of clonal and seed propagation, scale-up and distribution in order to shorten the time for new varieties to reach farmers.
- **Global collaboration.** Policy, regulatory harmonization and collaborative platforms to support global collaboration in breeding, germplasm access and variety introductions (between countries, governments, institutions, and industry).
- **Agronomic support.** Research and technical assistance to develop agronomic recommendations (e.g., nutrition, spacing, inter-cropping, pest control, etc.) to farmers for new variety introductions.