

# Innovea

## Global Arabica Breeding Network

### Transforming coffee agriculture for climate-resilience through collaborative global breeding

The Innovea Global Arabica Breeding Network brings together collaborating countries to transform global coffee breeding and accelerate the pace of coffee genetic improvement.

The future of coffee agriculture depends on accelerating the development of better varieties. That's not an overstatement. Luckily, tremendous gain can be achieved when modern, innovative, and collaborative methods are brought into coffee. This network enables coffee-producing countries—for the first time—to work together to pursue the continuous development of better coffee varieties, tailored to the unique needs of their farmers and markets. Given the timelines for breeding a tree crop like coffee and the reality of climate change, using modern breeding tools to speed up genetic gain is absolutely essential.

**An elegantly designed program to achieve transformative change.** All of coffee agriculture depends for its success on agricultural science conducted by a constellation of national coffee institutes around the world, typically working in isolation from one another. Despite herculean efforts, these individual national research programs face significant limitations working alone—from aging scientists to outdated breeding approaches to lack of funding. In particular, over the last 50 years, national-level investments in the creation of new varieties have faltered, creating a crisis of innovation that makes the coffee industry's sustainability, quality, and supply

#### What can breeding do?

The right variety, adapted for a specific production environment and market demands is the fundamental building block of any high performing agricultural system. This can be achieved through modern plant breeding approaches to bring more durable resistance to key pests and diseases into coffee varieties, reducing the need for pesticides. It can bring higher-quality coffee to lower elevations, expanding the potential for production in tomorrow's hotter temperatures. It can deliver varieties with higher yield across a broader array of environments—critical for climate change adaptation. Agricultural science is critical to secure the global supply of high-quality coffee in the face of the climate crisis.

assurance goals difficult if not impossible to achieve. The Innovea network's unique collaborative design provides tremendous value to countries unable to tackle the challenges of climate change on their own. The globally coordinated approach has brought together a wide diversity of genetic material and will enable large numbers of lines to be evaluated across many different environments. With this network we will be able to achieve results that would not be possible for a more traditional program operating within the borders of a single country. Furthermore, the network gives participating countries unrestricted access to new genetic materials, training in modern breeding approaches, and shared tools while also connecting researchers across national boundaries to achieve results that would be impossible for programs working in isolation.

# How does the program work?

## Nine global partners.

Costa Rica, USA, India, Indonesia, Kenya, Mexico, Peru, Rwanda, and Uganda are the network participants. These collaborators together produce ~23% of the world's arabica coffee exports.



## Population development & finished varieties.

The network's primary focus is on the development of genetically diverse breeding populations, which are distributed to network participants every 6 years to continually replenish national breeding programs with superior breeding material. Participating countries remain in charge of the development and release of finished varieties tailored for local conditions and niche market demand. WCR also supports partners via investments in capacity building.

## Time-to-farmers.

Finished variety development is a long-term endeavor. Depending on the breeding approach and the performance of the material, some countries could release new varieties as early as 2033. Most will take several more years. After that, new varieties can be released in a country as often as every 3-5 years.

## Cooperation + Competition = Coopetition.

The network's collaborative design lowers the cost for individual countries to access modern breeding tools (cooperation), while countries remain in the driver's seat regarding finished variety selection and variety release to give their farmers a competitive edge (competition).

## New and unique genetic combinations.

The network's breeding population is being created from a wide diversity of high-performing varieties from Africa, Asia, and the Americas that have never been brought together before. The crosses have been designed to bring together high-priority traits such as yield, disease resistance, and cup quality. The first population will be distributed to network partners for evaluation in 2023.

## Open-source genetics.

WCR will create new, improved breeding populations that partners can use without restrictions on their use.

## Modern breeding.

The network will use genomic selection with recombination centralized at WCR's breeding factory in Costa Rica, to create improved populations as fast as possible. Each new population cycle will recombine individuals with the highest breeding values across traits. Phenotyping is carried out by partners at globally distributed sites. These approaches allow breeders to tackle multiple problems simultaneously (such as yield, disease resistance, cup quality, and climate resilience) and to speed up improvement. *Note: The breeding network will not engage in genetic modification.*

## Demand-led.

Using principles of demand-led breeding ensures that finished varieties are ones farmers want to grow and that roasters and consumers want to buy.

## Multi-environment testing for climate resilience.

Breeding populations will be distributed to sites in many countries with different agroecological environments, exposing them to diverse and sometimes extreme environmental pressures. Aggregated global performance data will indicate which plants have stable performance across climates. The most stable plants can be released for farmers and can be used in subsequent breeding to increase climate resilience traits to make even better varieties.

## Funded by the coffee industry.

The network is funded by the 200+ member companies from 27 countries that make up World Coffee Research. These companies are leaders in the global coffee industry driving science-based agricultural solutions to urgently secure a diverse and sustainable supply of quality coffee today and for generations to come.



## LEARN MORE

Scan the QR code or go to [worldcoffeeresearch.org/innovea](https://worldcoffeeresearch.org/innovea) to read more about the program.