Innovea Global Coffee Breeding Network

Uganda Arabica Breeding: Current Progress, Challenges, and Goals

I. Report Overview & Objectives

- **Project Title:** Innovea Global Coffee Breeding Network
- **Reporting Period:** February – November 2025
- **Partner Institution & Location:** National Coffee Research Institute, Uganda
- **Date of Report:** November 4, 2025

Alignment with Core Objectives

Strengthening collaborations with network partners

- Continued strong collaboration with partners in Rwanda, Kenya, and WCR.
- Joint field establishment at Bugusege, shared data systems, and coordinated SNP genotyping.
- The network remains aligned and moving together toward shared breeding goals.

Improving breeding populations

- Diverse Arabica populations under evaluation, giving confidence in future variety options.
- Continuous data collection on growth and CLR performance.
- High-quality SNP data now available, supporting the identification of vigorous, rust disease-resistant lines and strengthening selection potential.

Enhancing national breeding and research capacity

- Adoption of FIELD Hub and Mr. Bean platforms has improved trial designing, digital data capture and analysis.
- These tools are helping us run product-focused research efficiently.
- To fully apply genomics, continued WCR support for full Mr. Bean subscription will be important

Developing national varieties that respond to the international export market and farmer demands

- Early results show promising genotypes with good vigour and CLR tolerance.
- These selections form a strong foundation for high-performing, market-competitive varieties that can meet both farmer needs and export quality standards.

II. Overall Progress

A. Executive Summary of Achievements

This year, we focused on building a strong foundation for long-term Arabica genetic improvement.

- Two datasets for growth traits (plant height, stem diameter) collected and analyzed.
- Three CLR datasets collected across juvenile and maturing stages, giving valuable insights into disease responses.
- Harvest data collection has begun; full results will be shared after season completion.
- Leaf samples from 300 genotypes processed and genotyped at DArT Australia, returning high-quality SNP data (95% call rate)**.**

These activities now place us in a strong position to combine phenotypic and genomic information to guide selection in the next phase.

B. Project Implementation & Milestones

Milestone	Status	Output
Growth data (12 MAP & 18 MAP)	Completed	Uploaded datasets
CLR severity data (3 rounds)	Completed	Uploaded datasets
Harvest data	In progress	Data collection underway
Leaf tissue sampling	Completed	300 genotypes shipped & genotyped

III. Challenges and Limitations

Field & agronomic challenges

- Budget reduced by >40%, limiting fertilizer use and monthly root-mealy bug sprays.
- Higher pest pressure led to loss of some promising genotypes.
- Funding stability remains crucial to protect trial integrity and reliable estimates of trait heritability and genetic gains.

Research & analysis limitations

- Bugusege is a CLR hotspot but does not expose plants to CBD.
- CBD screening (artificial inoculation) remains unfunded and needed.
- SNP data now available; capacity-building in molecular/genomic analysis needed to maximize benefits.
- Most materials are segregating hybrids. This calls for urgent need to build capacity for clonal propagation for elite selections.

IV. Next Steps and Future Goals

Addressing research gaps

- Explore CBD testing options through partnerships or controlled inoculation.
- Strengthen capacity in genomic data analysis and interpretation.
- Develop clonal propagation capacity to secure emerging best-performing lines.

Future data collection & analysis

- Continue multi-season scoring of growth, yield, and disease traits.
- Use genomic data to study diversity, identify key loci, and pilot genomic selection tools.
- Where possible, include more test sites or artificial inoculations for CBD evaluations

Toward climate-resilient varieties

- Combine performance under Bugusege's high-disease pressure with genomic insights to identify climate-resilient genotypes.
- Prioritize resilient, productive, farmer-preferred selections for advancement.

Advancement of improved material (Cycle 1)

- Begin clonal multiplication of standout plants.
- Establish second-stage nurseries and multi-location trials (including CBD-risk sites).
- Feed best lines into crossing blocks to build the next generation of improved populations.
- Transition elite materials to farmer-participatory trials and eventually to the national variety release pipeline.