

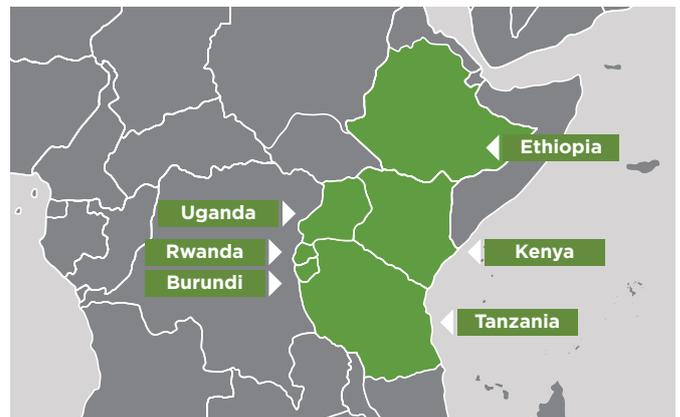


Australian Government

Australian Centre for
International Agricultural Research

Crops

Rapid breeding for reduced cooking time and enhanced nutritional quality in common bean (*Phaseolus vulgaris*)



Overview

The health and well-being of African small landholders – women, men and children – would benefit from common bean varieties with shorter cooking time, higher protein and increased iron and zinc.

Long cooking times is a disincentive to consumption as it demands larger quantities of water and fuel. Firewood and charcoal are generally collected by women and children at great personal risk and environmental cost. Health risks are also imposed through prolonged exposure to smoke during cooking.

New breeding methods based on pedigree and genomic selection, together with optimal contribution selection, offer an opportunity to accelerate breeding of the common bean for rapid cooking time and higher iron and zinc content.

This project will implement gender-inclusive training programs in the new breeding methodology in East Africa and new marketing approaches to ensure equitable access to new varieties developed in the project.

KEY FACTS

ACIAR Project No. CROP/2018/132

Duration: August 2019 to June 2024 (5 years)

Target areas: Burundi, Ethiopia, Kenya, Rwanda, Tanzania, Uganda

Budget: A\$2,259,804

Project Leader

Professor Wallace Cowling, University of Western Australia

Key partners

- International Centre for Tropical Agriculture
- National Crops Resources Research Institute, Uganda
- Kenya Agricultural and Livestock Research Organisation
- Maruku Agricultural Research Institute, Tanzania
- Rwanda Agriculture and Animal Resources Development Board
- Institut des Sciences Agronomiques du Burundi
- Ethiopian Institute of Agricultural Research

ACIAR Research Program Manager

Dr Eric Huttner

Objective

The overall objective of this project is to develop improved common bean varieties for fast cooking time and improved iron and zinc content through annual cycles of pedigree and genomic selection, and to train African plant breeders in a new rapid method of plant breeding based on optimal mating designs.

Specific objectives include:

- Achieve at least 30% reduction in cooking time, 15% increase in iron and 10% increase in zinc over current varieties in five years.
- Engage and train the next generation of African plant breeders in the new efficient breeding technology.
- Disseminate new bean varieties through existing Pan-Africa Bean Research Alliance (PABRA) bean improvement regional networks.

Expected scientific results

- Integration of the new breeding method into the International Center for Tropical Agriculture (CIAT) and PABRA bean breeding program.
- Founder lines will include regionally adapted bean lines from all partner countries and improved lines will be distributed to the PABRA project partners in national bean breeding programs, annually.
- The novel breeding approach introduced in this project could revolutionise plant breeding methodologies to achieve faster and higher genetic gains, for longer periods. Results of the project will be of interest to plant breeders worldwide.
- Identification of the best modalities of application of the method (e.g. on acquiring and utilising commercial DNA marker data, on family size, on number of cycles, selection pressure etc).
- If the approach is validated by this project there could be wide adoption by plant breeders and the partners of this project would form a core of trainers to disseminate the method.

Expected outcomes

- Identification of new genotypes of climate-resilient and adaptable beans that are 30% faster in cooking time, 15% higher in iron and 10% higher in zinc compared to the founder population.
- Within five years of completion of the project, African farmers and consumers will have access to the new rapid cooking bean varieties.
- The new varieties will be selected for yield, bruchid resistance, disease resistance, drought tolerance, and other important traits for the region.
- Training of African bean breeders in the new methodology of pedigree and genomic selection and optimal contribution selection for continuation beyond the project phase, and beyond bean breeding to other crops in Africa.
- The breeders in the CIAT/PABRA network will continue the new breeding approach and achieve genetic advances after the project ends, so these benefits will continue across Africa through peer-to-peer training.

