



## Demand-Led Breeding for faster cooking beans to save East African consumers \$ 1.4 billion

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Cooking beans for a long time causes them to lose nutrients, increase biomass consumption and drudgery for women and children who spend a lot of time gathering firewood. Due to increase in population pressure on land, wood fuel, which is a key source of energy for cooking beans in Africa, is becoming increasingly scarce and more expensive. Currently, children and women in the rural areas spend too much time gathering firewood, which becomes tiring to prepare food. In Urban areas, cooking a kg of beans has become as expensive as buying it. These trends are fueling concerns among researchers and policymakers about a potential malnutrition crisis as the populations may shift from traditional to convenient but probably less nutritious foods. Exposure to the smoke poses a health hazard as well.



*The region is a heavy consumer of beans and currently spends about USD 4,182,304,058 per year on cooking dry beans.*

Common bean is among traditional foods valued for its high nutritional and health benefits. The crop is also appreciated as an affordable source of protein compared with animal-based and a major source of micronutrients, such as iron and zinc. However, over 80% of common bean grain is consumed as dry and takes longer to cook. In recognition of this challenge, bean breeders at the [Alliance of Bioversity International and the International Center for Tropical Agriculture \(CIAT\)](#), and national bean program partners through the [Pan Africa Bean Research Alliance \(PABRA\)](#) started developing varieties for faster cooking time over the past years. However, this approach proved to be slow as the cooking time of varieties



currently existing in the East African markets including the Ugandan market is about 120 minutes (2 hours). Responding to the same concerns of long cooking time, bean researchers worked with the private investors and introduced pre-cooked beans that take about 15 min to cook in Uganda and other East African countries in 2017. This industrial-based solution though exciting, has not generated tangible impacts because processed beans are not affordable and accessible to the majority of the bean consumers.

To ensure that beans do not lose their place on the food menu, the Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) entered into collaboration with the University of Western Australia, and six East African national bean programs including the [National Agricultural Research Organization \(NARO\)](#) in 2019 and started to breed for short cooking beans as an affordable solution for low-income earners. The other East African countries include [Burundi \(ISABU\)](#), [Ethiopia \(EIAR\)](#), [Kenya \(KARLO\)](#), [Rwanda \(RAB\)](#) and [Tanzania \(TARI\)](#) with the support of the [Australian Centre for International Agricultural Research \(ACIAR\)](#).

However, the success of this project requires that breeders have good access to information on the demand for cooking time in East Africa, and know the trait levels that match the needs of the market. Donors also need to know the potential benefits of the investment to support breeding for reduced cooking beans. Hence a market research study was commissioned in Uganda (with the understanding that the findings can be extrapolated to the other five east African countries) with the support of the [Australian Centre for International Agricultural Research \(ACIAR\)](#); [Syngenta Foundation for Sustainable Agriculture \(SFSA\)](#) and [Crawford Fund for a Food Secure World](#) under the [Demand Led breeding project \(DLB\)](#) project in 2020.



The market study used a combination of methods. It started with extensive consultations of all stakeholders along the value chains and compiled information that helped to define the cooking time at three levels (i.e. 60min, 75min, and 90 min). The trait levels were combined with levels of other traits in

designing hypothetical product profiles on choice cards used for eliciting the choices of participants. About 1064 male and female respondents participated. Each participant was given three options to choose from; two being hypothetical scenarios we wanted to test and one representing the status quo.





Results confirmed that all Ugandan bean consumers prefer bean varieties that take a shorter time to cook as compared with the ones they have. The utility derived from the reduced cooking trait and willingness to pay for it increase with the level of reduction in cooking time but at a decreasing rate. Results suggest that when developing product profiles, the minimum score for reduced cooking time trait should be aligned to the preferences of consumers that represent the future market for beans—the relatively young and educated individuals, the majority of whom reside in urban areas. The consumers in this market segment will be satisfied with new varieties that take 75 min or less to cook—down from 120 min average for the varieties currently existing on the market.

The reduction in cooking time comes with economic gains in form of saving on water, fuel and time needed to supervise the process. Uganda being a heavy consumer of beans currently spends about USD 1,144,439,995 per year on cooking dry beans. Study findings reveal that the investment in breeding to reduce cooking time, has the potential to save up to USD 400.6 million per year for the consumers if the average cooking time of beans is reduced from 120 min to 75min—and if all bean varieties on the market are replaced with ones that cook for 75 minutes or less.

**Table 1. Demand for dry beans, cost of fuel, water and time for cooking of existing varieties and potential cost saving with faster cooking beans**

Country	Population	Quantity of dry beans consumed (tons) per year	cost of cooking dry beans per year (USD )	Potential cost saved (USD) from reduced cooking time beans
Burundi	12,000,000	378,000	525,420,000	183,897,000
Kenya	53,771,296	639,878	889,431,007	311,300,852
Tanzania	59,734,218	851,213	1,183,185,523	414,114,933
Rwanda	12,952,218	316,423	439,827,533	153,939,637
Uganda	45,741,007	823,338	1,144,439,995	400,553,998
<b>Total for five countries</b>	<b>184,198,739</b>	<b>3,008,852</b>	<b>4,182,304,058</b>	<b>1,463,806,420</b>

Source: Authors' computations

Given the similarity in bean consumption patterns and preparation practices among populations across East Africa, our results provide perspectives for the five countries (Uganda, Burundi, Rwanda, Kenya and Tanzania) in the region that are participating in the project. Because these five countries are highly populous (**184,198,739**) with a high bean consumption demand (3 million tons of dry beans per year), their annual budget for cooking dry beans alone is about USD 4.2 billion





in total. The high cost of cooking dry beans makes the investment very relevant for East Africa as the region stands to save an equivalent of USD 1.5 billion per year with the investment in breeding to reduce cooking time by at least 30%.



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