The contribution of the CIAT genebank to biofortified beans and farmers’ welfare in Rwanda

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Data and methods
We assessed the contribution of the CIAT genebank to the development of biofortified bean varieties and their impact on the well-being of farm households in Rwanda. To do this, we:

- traced the “journey” of bean accessions from their collection and introduction into the genebank to their use in Rwanda
- linked 7 iron-biofortified climbing varieties introduced in Rwanda (CAB2, RWV3316, RWV3317, RWV3006, RWV2887, MAC44, MAC42) directly to CIAT’s genebank through pedigree analysis and key informant interviews with the breeders who developed them.
- estimated the impact of bean adoption on production and consumption of farm households in Rwanda, drawing from nationally representative data on bean producers in Rwanda collected by Harvest Plus, in partnership with CIAT and the Rwanda Agricultural Board.

The 2015 survey followed the distribution of iron-biofortified (bush and climbing) bean varieties from its release in 2010. In the first phase of the survey, 19,575 households in 120 randomly selected villages were interviewed regarding their history of iron-biofortified bean varieties. In the second phase, a total of 1,397 households were surveyed (12 from each village) for in-depth interviews on bean production and consumption patterns. The econometric analysis extends research by Vaiknoras and Labarta (2018) on the impact of the bush iron-biofortified variety RW22245 on farmers.

Challenges and opportunities
Gathering information on pedigrees was an extremely difficult activity. Much of the information about the breeding process that led to the development of iron-biofortified varieties has been lost. Written documentation was not standardized and much information is recorded only in the memories of experts. Further, communication between CIAT’s genebank and bean breeders is sporadic and there is no feedback process in the use genebank materials.

Breeders and development process of improved varieties could be accelerated with enhanced collaboration and more active exchange of information between breeders and genebanks.

We found a weakly significant effect of climbing beans on yield, using the same estimation models and variates linked 7 iron-biofortified varieties (compared to the earlier work on bush climbing varieties on the well-being of farm households in Rwanda.

From genebanks to iron-biofortified beans
Iron-biofortified bean varieties are a result of a long process that began in the 1990s and involves several universities and international institutions, including CIAT’s genebank.

MAC42 and MAC44 were developed using 12 genebank accessions: G12722, G21720, G6616, G4523, G76, G6533, G14013, G11891, G4505, G5704, G4452, G5709 (with country of origins from Colombia, the Dominican Republic, United States, Brazil, Mexico and Peru).

RWV3316, RWV3317, RWV3006, and RWV2887 are the result of the combination of the variety CAB2, developed at CIAT by Julia Kornegay, with either a local Rwandan variety or another CIAT’s bred variety.

CAB2 is an important progenitor in the development of iron-biofortified varieties in Rwanda. It was the result of breeding between the genebank accession G20557 and the improved variety VCB81010 of CIAT’s genebank, whose progenitors were G3467 and G2540 from CIAT’s genebank.

CIAT’s genebank played an important role in the screening of germplasm in search of needed traits for biofortified bean varieties that address the problem of malnutrition.

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