Genetic Improvement of Middle-American Climbing Beans for Guatemala

The Challenge
Guatemala is mostly a rural country, with 60 percent of its populations living on farms. Maize and beans compose the staple food in most households, with per capita bean consumption of 9.4 kg per year—an insufficient amount of protein for acceptable nutrition, especially within poor households.

Chronic malnutrition is frequent (67 percent) among children under five in the western highlands. One-third of children six to 59 months show evidence of anemia, along with 18 percent of reproductive-age women, 29 percent of pregnant women, and 23 percent of breastfeeding women.

Beans grown in Guatemala’s highlands are mostly climbing beans, which grow around the corn they’re planted with as part of the traditional milpa system. Unfortunately, on-farm productivity of these climbing beans is approximately one-third their genetic potential, mostly due to bean varieties unable to withstand biotic and abiotic stresses. Pests and diseases are the main cause of yield reductions.

The Project
Using an existing ICTA collection of 600 accessions of climbing beans from growing regions throughout Guatemala, researchers are working to develop germplasm with improved disease and insect pest resistance as well as greater yield potential. The resulting lines will be released into the Western Highlands communities to improve diets and nutritional health.
Project Objectives

2. Characterization of the genetic diversity of this unique set of germplasm.
3. A better understanding of the current socioeconomic status and needs of bean production within the context of intercropping systems in the region.

Projected Outcomes

1. The development and release of improved climbing beans with better agronomic performance.
2. A better understanding of the organization of the genetic diversity within this unique set of germplasm.
3. Identification of genomic regions associated with traits of agronomic and economic importance.
4. A database of the current market and production needs of climbing beans in Guatemala’s highlands.
5. Training of the next generation of plant breeders.

Major Achievements to Date

1. Establishment of a breeding pipeline and first set of crosses.
2. Initial molecular characterization (DNA extraction) of the climbing bean collection.
3. Collection of seed samples from surveyed growers and seed increases in the greenhouses.