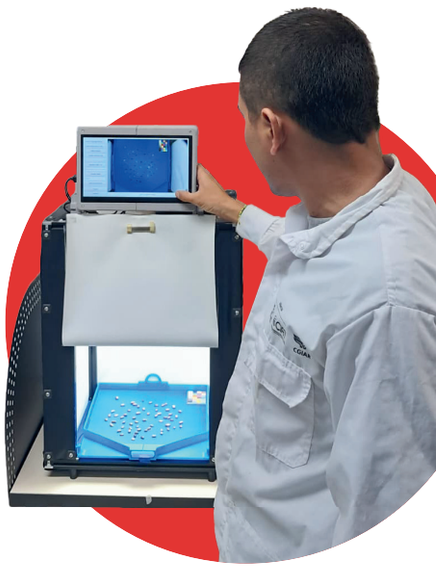
Bean mechatronics laboratory

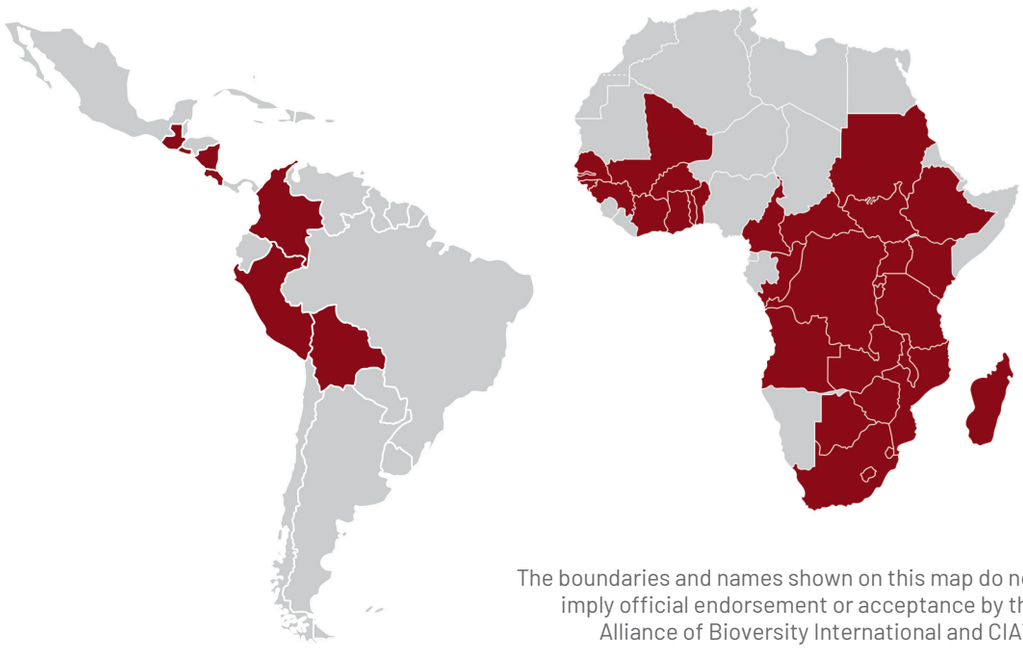
Goal

The mechatronics laboratory plays a key role in supporting the bean breeding program by developing devices and automating processes related to phenotyping and genotyping. Through the integration of mechanical, electronic, and control technologies, the lab significantly enhances the efficiency and precision of data collection and analysis, reducing the time and resources required for selecting superior lines. Its contributions help accelerate the identification of desirable traits, thus fostering innovation in agricultural research.



Where we work

We provide solutions for bean breeding and research programs in Africa (PABRA), Latin America (Kolfaci), and the Caribbean.



The boundaries and names shown on this map do not imply official endorsement or acceptance by the Alliance of Bioversity International and CIAT.

How we do it

Mechatronics and automation: Designing and deploying custom devices to automate data collection and streamline breeding workflows, increasing efficiency and precision in research.

Phenotyping and trait analysis: Implementing high-throughput and automated phenotyping systems to assess plant performance under diverse conditions with accuracy and consistency.

Data science and bioinformatics: Applying advanced analytics to integrate genomic, phenotypic, and environmental data, supporting informed decision-making in the breeding pipeline.

The integration of the previous disciplines contributes to breeding and selecting new bean varieties with enhanced resilience to biotic and abiotic stresses, improved nutritional value, and greater adaptability to changing climates.

The impact

Increased efficiency in data collection

The lab designs and implements automated systems that streamline phenotyping and genotyping workflows. These systems reduce the manual labor and time required for processing large populations, accelerating breeding cycles.

Custom device development

The lab develops tailored mechatronic devices adapted to the specific needs of bean research; these tools enable the study of complex traits that are difficult to measure manually.

Enhanced precision and consistency

Automation minimizes human error and variability in measurements. High-resolution sensors and control systems improve the accuracy of trait quantification, ensuring reliable data for selection decisions.

Support for scalable and reproducible research

The integration of standardized protocols and automated platforms allows the research to be easily scaled up or replicated across different locations. This supports collaborative efforts and data sharing among breeding programs and research institutions.

Actions for innovation

Custom-built automation platforms for high-throughput phenotyping and genotyping, reducing manual labor and increasing efficiency.

Automated environmental monitoring tools that support controlled experiments and real-time data collection.

Modular and scalable systems that can be adapted across different research sites and breeding programs.

Technologies

The automated IoT platform for greenhouses

The powderbot (automated device for drilling crop seed samples to extract seed powder for DNA extraction)

Humidifier

Cooking machine

Pod harvest index machine

IoT Automated Plant Meter – LysipheN

Para saber más sobre el programa, visítanos:

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