

The role of rural telecommunications in agricultural research: Genetic Improvement of crops in tropical countries

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Agenda



Introduction to CGIAR- CIAT



The problem



The solution

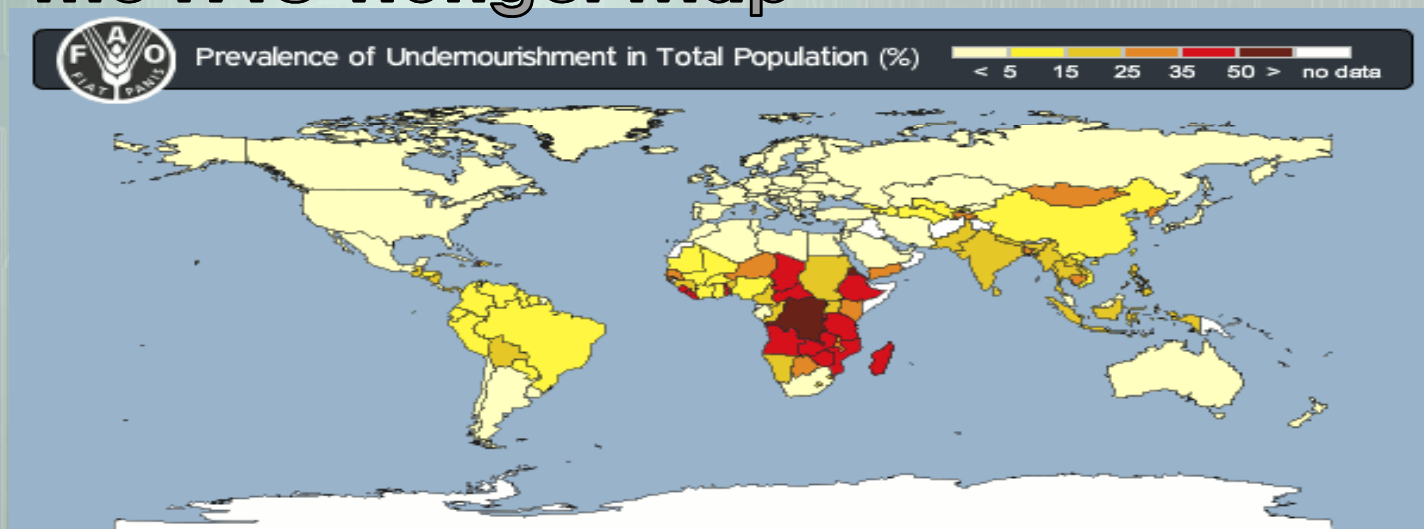


Choice of Technology

Food security ?

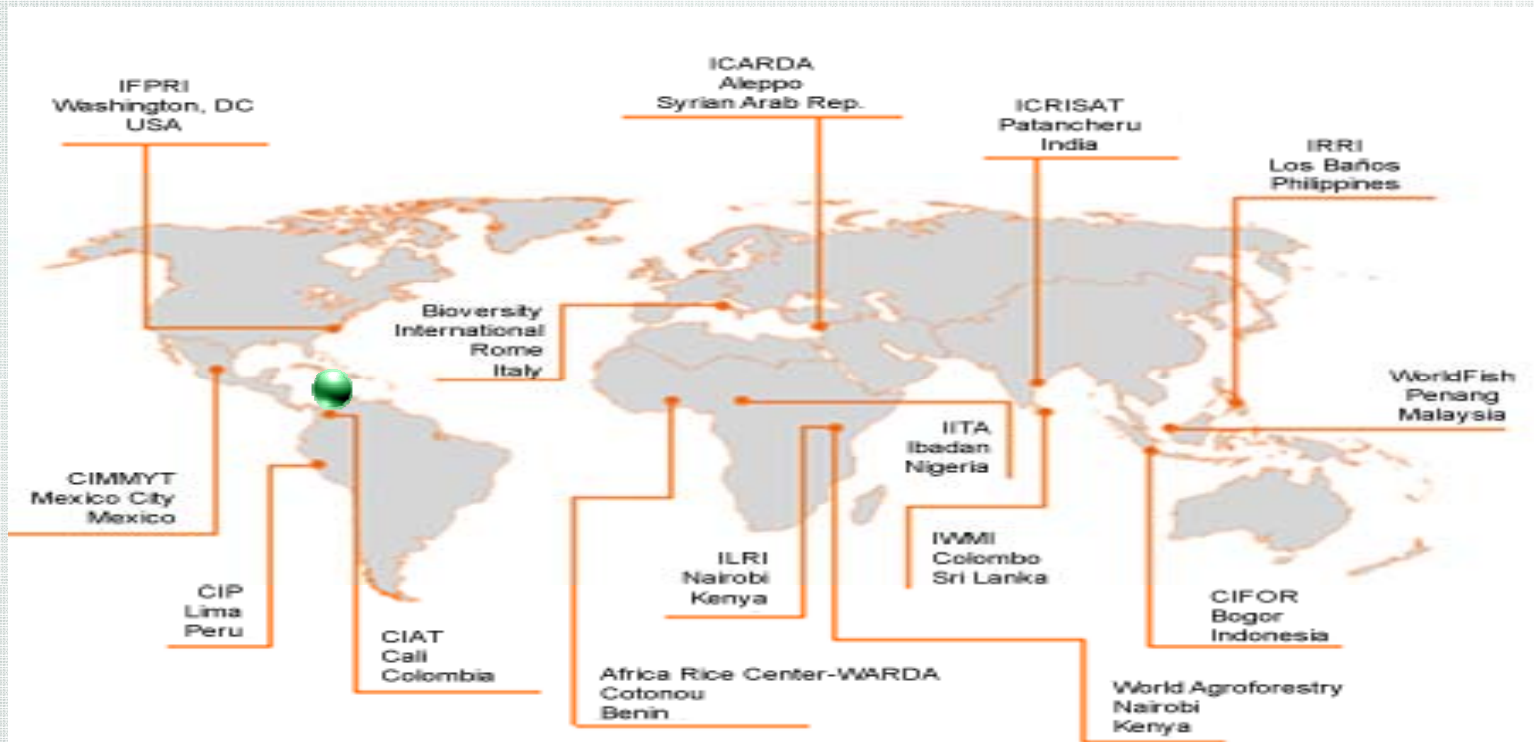
Exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life

The FAO Hunger Map



<http://www.fao.org/cfs/en/>

The **International Center for Tropical Agriculture- CIAT** is one of the 15 centers that make up the Consultative Group on International Agricultural Research -CGIAR , which was established in 1971 as a strategic partnership and has now grown to 64 members supporting 15 international centers:

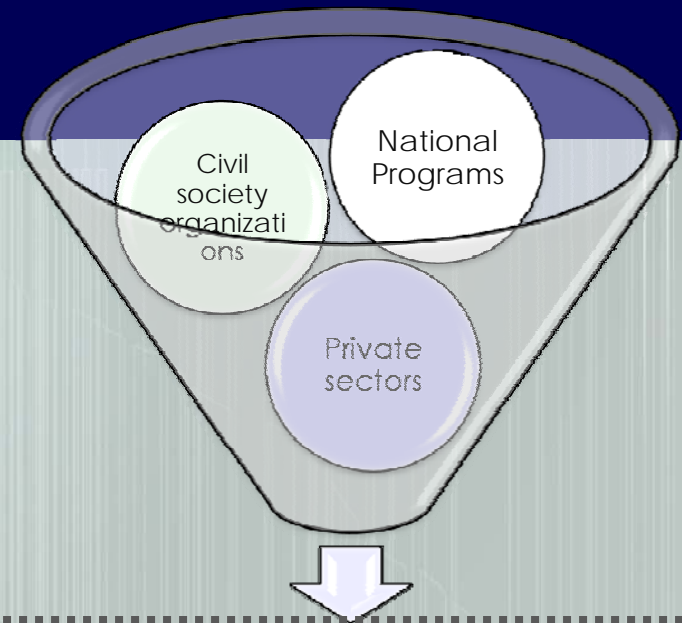


<http://www.cgiar.org/centers/index.html>

Vision

- To reduce hunger and poverty, and improve human health in the tropics through research aimed at increasing the eco-efficiency of agriculture.
- Engagement of key scientific competencies to achieve significant impact on the livelihoods of the poor in the tropics.

*Interdisciplinary
and applied
research through
partnerships*



International Public Goods →

Improved Germplasm, technologies,
methodologies and knowledge

“Producing more and better food at lower cost through genetic improvements”

Collection, characterization, and conservation of plant genetic resources.

Maintenance of genebanks at eleven CGIAR Centers, where more than 650,000 samples of crop, forage, and agroforestry genetic resources worldwide are held.

In CIAT Latin America, research has been focused on the breeding of high priority crops:

- Rice
- Yucca
- Beans (the biggest germplasm bank in the world)
- Tropical forage

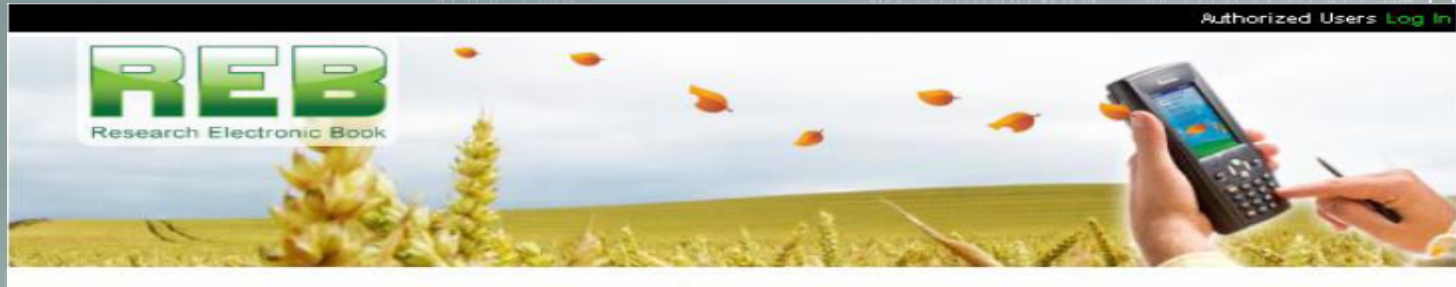
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Capacity building in the region through institutional innovation, knowledge management and skill formation

<http://www.cgiar.org/impact/genebanksdatabases.html>

The problem

- Researchers at CIAT carry out trials in which they evaluate seeds that have been genetically modified to become more resistant (to pathologies, entomologies, extreme climate conditions, etc)
- Data has to be gathered in different remote zones across the country (8 experimental areas in Colombia)
- The crop areas usually do not have cellular network coverage or access to the public telephone network.
- The data was usually collected and stored on physical books but this information was not available in digital format.

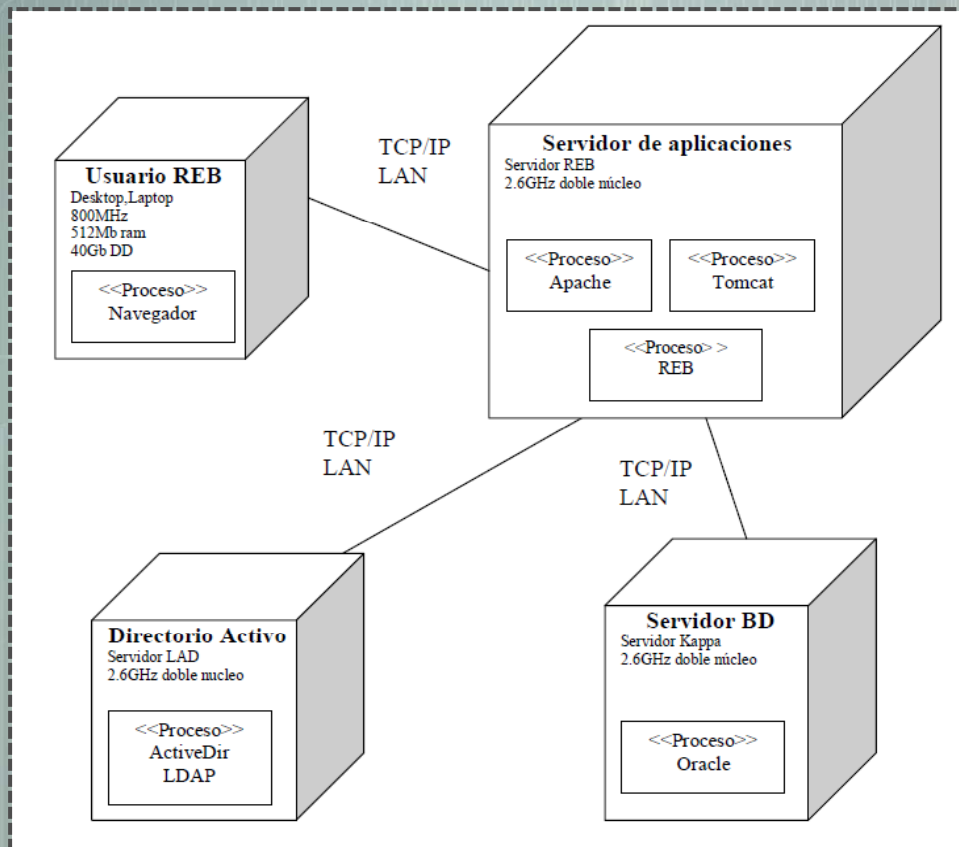
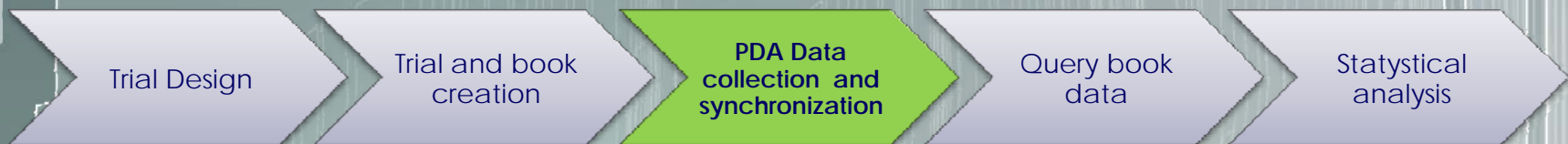


- The Research Electronic Book-REB- is a project developed to optimize the field and lab data collection and the data availability and access processes.

Technology:

- Web application developed using Java.
- Handheld device for data collection.
- Bar code reader for faster searches.
- Wireless Network to update the PDA data to the central database (USB and GPRS is also available).
- Excel, CSV and XML data exports.
- Oracle Database.

The solution



Offline field work

- Transfer the book from the web application to the mobile terminal.
- Collect the data (Local)
- Transfer the book from the PDA to the web application.
- The web application has an export utility that allows the books to be exported on Excel, CSV or XML formats.

Ruggedized Handheld Personal Computer (HPC)

Essential requirements for mobile mapping:

- Sunlight readable displays and back lighting.
- Rugged, some degree of drop-proof capability.
- Temperature tolerant.
- Water-resistant & dust proof.
- 8-10 hours of continuous operation
- Quick and easy removal from vehicles for foot-mobile handheld use.

- Manufacturer: Psion Teglogix
- Operating system: MS Windows mobile 6, classic, professional.
- 802.11a/b/g, 2.4GHz and 5GHz bands
- GPRS/EDGE , 3G HSDPA voice and data
- Bluetooth
- RFID HF (13.56 MHz), LF (125KHz, 134.2 KHz), UHF (868MHz , 915MHz)
- Barcode: ID laser scanning. 1D linear imager, 2D area imager
- Power management: 3.7V, 3000 mAh capacity battery.



<http://www.psionteklogix.com/us/products/handheld/workaboutpro.htm>

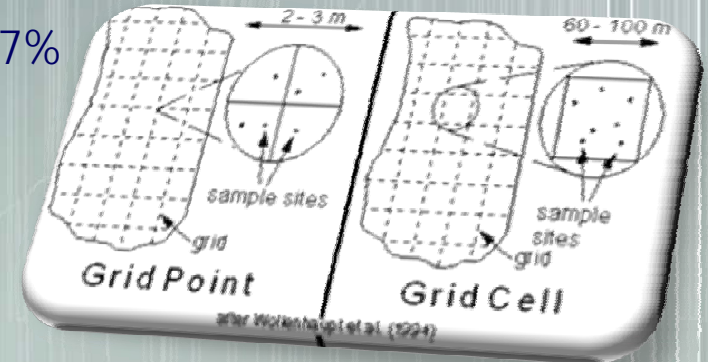
Satellital monitoring

Uses Nationwide Differential GPS Service NDGPS

- Real Time Horizontal Accuracies of 1-5 meters.
- Broadcast Availability Level - 99.7%
- Integrity

Soil sampling:

- *Area sampling (grid cell)*
 - *Point sampling with interpolation (grid point)*
- GPS receiver and a source of differential corrections
 - Acquire an accurate horizontal position that represents the soil sample location.
 - Having acquired the coordinates, the position can be entered into a database while in the field.
 - All the physical soils data (texture, pH, nutrients, etc.) can be tagged to the coordinate location.



Remote synchronization with the central database:

GPRS/EDGE

3G HSDPA

W-LAN (WiFi)

Or Downloaded to a desktop PC and execute a batch transaction over the LAN.

Increased ability to collect field data, with unique geospatial time tags and attributes: maps, photographs, topography, field observations, testing results, climatic data. These data is the input for research areas such as:

- Land preparation
- Seeding
- Chemical application
- Fertilizer application
- Crop monitoring
- Pest management
- Conservation practices
- Gross margin analysis

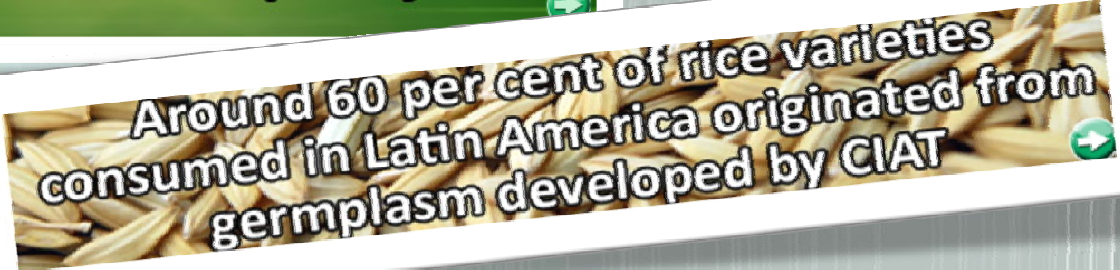
Improved Germplasm

- Increase productivity and net profit
- Sustain natural resources
- Provide better decision making ability

- **Ultimately:** Contribution to increase Food Security and reduce poverty reduction in the World




Over half the cassava varieties grown in Thailand were developed by CIAT



Around 60 per cent of rice varieties consumed in Latin America originated from germplasm developed by CIAT



35 million African farmers grow beans developed by CIAT and our partners



More than 40,000 smallholders have adopted CIAT's improved forages in Southeast Asia



Thank you!