Improving Rural Livelihoods:

CIAT's Medium-Term Plan 2005-2007

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CIAT MEDIUM-TERM PLAN

2005-2007

July 31, 2004

NARRATIVE HIGHLIGHTS

Introduction and Context

CIAT's 2005-2007 Medium Term Plan, like its previous plan, is focused around three key development challenges:

- Sharing the benefits of agrobiodiversity
- Overcoming land degradation
- Enhancing rural innovation

These three challenges all contribute critically to reducing poverty through increased agricultural productivity and improved natural resource management. Together, meeting these challenges will enable the rural poor to improve their food security and to be more competitive in agriculture which remains the mainstay of the livelihoods of most rural people in low-income countries. Together, meeting these challenges will enable the rural poor to better husband the land that is a key resource underpinning agriculture. Together, meeting these challenges will strengthen the capacity of rural communities for innovation to enable them to meet new opportunities and challenges of changing agricultural technologies and markets; new opportunities for knowledge management; and intensified pressure on the natural resource base. Clearly, meeting these three challenges is inter-dependent. For example, conservation and utilization of genetic resources is essential to a competitive agriculture but so also is the sustainable use of the land resource.

CIAT's project portfolio for 2005-7 through which CIAT's research is implemented is grouped within this plan according to these three development challenges in order to better show the overall coherence of CIAT's efforts. However, the outputs of many projects contribute to more than one of the development challenges. For example, while the bean project is classified under the sharing the benefits of agrobiodiversity initiative, it also produces outputs that are central to the land degradation initiative.

Sharing the benefits of agrobiodiversity entails conservation of genetic resources; a policy environment that ensures to rural communities access to needed genetic resources and appropriate recognition for their genetic resources; and relevant research to improve the genetic resources available to rural communities. To contribute to this challenge, working with partners, CIAT conserves genetic resources of beans, cassava and tropical

forages; works with national systems to strengthen their capacity for dealing with genetic resource issues; and works to genetically improve beans, cassava, tropical forages worldwide, and improve rice for the American tropics. In addition, CIAT's IPM project takes an integrated approach to dealing with pests and diseases, which undermine the productivity of crops, focusing on pests that attack CIAT crops and other tropical crops. Finally, CIAT has been gearing up research on tropical fruits, initially through information and decision-making tools to support the use of tropical fruit genetic resources. Important parts of CIAT research on the benefits of agrobiodivesity are being conducted through two CGIAR Challenge Programs: the Harvest Plus Program on biofortification to enhance the micronutrient content of food crops, a program that CIAT manages in partnership with IFPRI; and the Generation Challenge Program to exploit advanced science for the utilization of genetic resources.

Overcoming land degradation addresses a widespread and severe problem that threatens to undermine the livelihoods of many of the rural poor in the tropics. Land degradation includes soil degradation, but extends beyond soils to land use issues. Thus, overcoming land degradation requires a combination of understanding the driving forces behind land degradation and developing a series of technical alternatives and incentives to arrest and prevent land degradation. To contribute to this challenge, working with partners, CIAT conducts research to improve the biological management of tropical soil fertility through its Tropical Soil Biology Fertility Institute (TSBF) based in Nairobi, Kenya, at ICRAF. CIAT also conducts land use research utilizing geographic information systems analysis and it conducts research on the integrated management of soil and water resources in watersheds. Important parts of this research are conducted through the Food and Water Challenge Program of the CGIAR within which CIAT leads the research theme on upper watersheds management and through the Systemwide Soil Water Nutrient Management Program which CIAT convenes.

Enhancing rural innovation focuses on better enabling rural communities and service suppliers to rural communities to enhance the capacity for innovation in poor rural communities. This work includes developing methods and training materials to enable poor rural communities to identify their best market opportunities and to organize themselves to take advantage of these opportunities. Rural innovation also includes research and training on farmer participatory research to develop methods and to strengthen local capacity of adaptive research and enhance the links between rural communities and the formal research system. Finally, this work includes research on how rural communities can better access and manage knowledge on markets, technology, etc., to enable them to be competitive, sustain their natural resource base, and meet other livelihood needs. This work is integrated through CIAT's Rural Innovation Institute and includes CIAT' s ongoing management of the CGIAR Systemwide Program on Farmer Participatory Research and Gender Analysis. Although the Impact Assessment Project works across all CIAT projects to assess the expected and realized impacts of research at the level of rural communities and is not formally part of the Rural Innovation Institute, for heuristic purposes within the MTP tables it is included as part of rural innovation.

Highlights of the 2005 Project Portfolio

The major changes since the last MTP submission is the elimination of climate change research as a formal project within the CIAT organizational structure. CIAT remains convinced that climate change is an issue that will become increasingly important for the rural poor in the tropics. Research on issues such as carbon sequestration in different land use systems continues within the TSBF Institute while research on modeling the impacts of climate change on tropical agriculture continues within the Land Use Project. However, as part of an ongoing effort to simplify the organizational structure by reducing the number of projects; in response to lukewarm donor support; and in the context of the non-establishment of the expected CGIAR Challenge Program on climate change, the CIAT climate change project has been deleted from its project portfolio as an operational entity.

In response to the recommendations of an Internally Commissioned External Review of Land Use research in 2003, the strategic objectives of the Land Use Project have been recast to more effectively re-enforce the three strategic development challenges which form the main axes of CIAT research. The output on spatial analysis of biodiversity is aligned with the sharing the benefits of agrobiodiversity initiative; the output on indicators of vulnerability and risks of land degradation is aligned with the land degradation initiative; the output on information to support decision making at the local level is aligned with the rural innovation initiative.

Several other projects have made minor modifications since the 2004-06 MTP in the structuring or wording of their outputs. None of these reflect fundamental strategic shifts in the actual research that is being conducted. In response to the perceived preferences of the Science Council, however, all projects have made significant efforts to improve the specificity of their milestones but there are no other strategic changes in the 2005 Project Portfolio besides the two noted above on climate change and land use. Changes in the scale of projects reflect donor decisions on investment in different projects.

Measures of Progress/Achievement

In response to the perceived expectations of the new Science Council, Project Indicators are presented in more detail as part of the MTP. Previously such detail was managed internally at the level of annual workplans, so the only change really is of external publication.

Collaboration

As noted above, CIAT is increasingly active in the CGIAR Challenge Programs. Together with IFPRI, CIAT is coordinating the Harvest Plus Biofortification Challenge Program to increase the micronutrient content of crops through plant breeding. CIAT hosts the Breeding Coordinator and the Reaching the End User Coordinator for the CP. In addition it conducts research to improve iron content in beans and vitamin A content in cassava for the CP. In the Water and Food Challenge Program CIAT is leading the

research theme on upper watershed management. In the Generation Challenge Program on Genetic Resources, CIAT has initiated new research on beans, cassava and rice genetics. In the Sub-Sahara Africa Challenge Program, which has, yet to become fully operational, CIAT has participated in the design of the CP. CIAT intends to consult with its partners to re-invigorate the Systemwide Soil Water Nutrient Management Program.

FINANCIAL HIGHLIGHTS

Financial outcomes for 2003

Compared with 2002 figures, total income increased by 2%, from US$32 million in 2002 to $32.7 million in 2003. Total expenditures maintained stable at the level of US$32.6 million, ending the 2003-year with a marginal surplus of US$0.1 million (2002 deficit of US$0.6 million).

Compared with the estimates reported in the MTP submitted in September 2003, actual income was 8% less than projected for 2003, from $35.7 million to $32.7 million, and expenditures were also less by 7% from $35.2 million to $32.6 million. The decreases in both income and expenditures projections were caused by a slightly slower rate in implementing some of the confirmed restricted projects, than anticipated by CIAT. These activities now are expected to be executed in 2004.

Program Expenditures

Projects expenditures. The main shortfalls in implementation at the projects were: PE-3 Communities and Watersheds, -US$0.5 million; CP-1 Harvest Plus, -US$0.4 million; SB-2 Conservation and Use or Tropical Genetic Resources, -US$0.3 million and SN-1 Rural Agroenterprises Development, -US$0.3 million. These are due largely to unavoidable delays in fully implementing new donor contracts as a consequence of lags in staff recruitment etc.

Output by CGIAR outputs were broadly in line with the 2002 distribution. Sustainable Production accounted for 34 percent of expenditures. Germplasm Improvement accounted for 31 percent (32 percent in 2002). Germplasm Collection accounted for 15 percent. Enhancing NARS increased from 14 percent to 15 percent in 2003 and expenditures in Policy Research maintained in 5 percent. These minor variations reflect small differences in the patterns of donor funding and do not represent strategic shifts.

From the regional perspective, expenditures in Latin America and the Caribbean decreased from 51 percent to 48 percent. Expenditures in Sub-Saharan Africa increased from 34 percent in 2002 to 36 percent. Expenditures in Asia also increased from 14 percent to 15 percent, and expenditures in Central and West Asia and North Africa (CWANA) remained constant at 1 percent. These shifts reflect increased strategic priority to CIAT's global responsibilities, especially to Sub-Saharan Africa through CIAT's regional strategies for Africa and Asia.

According to the object of expenditures, the personnel costs were stable at 53 percent. Supplies and services decreased from 37 percent in 2002 to 35 percent in 2003. Travel expenditures increased from 7 percent to 8 percent and the depreciation cost remained constant at 4 percent.

Financial Indicators

The short-term solvency (liquidity) indicator is computated as current assets plus long term investment minus current liabilities, divided by per day operating expenses excluding depreciation**.** This indicator expressed as spending requirements in days, increased for CIAT from 66 days in 2002 to 76 days in 2003. Actions are being taken to progressively improve the indicator to reach the CGIAR indicative target of 90 days.

The long-term financial stability (adequacy of reserves – Equity) indicator is computed as unrestricted net assets less net fixed assets divided by per day operating expenses. Expressed as CIAT spending requirements in days, this indicator also increased from 54 days in 2002 to 58 days in 2003. The CGIAR approved target is a 90 – 120 days range. Starting in 2004 CIAT plans to have yearly surpluses of US$0.5 million to progressively improve the indicator.

Financial developments in 2004

CIAT fund raising in 2004 has been the most successful year for some time. Income estimates for 2004 in September 2003 in the last MTP submission, have been increased by 6 percent from US$34.5 million to US$36.5 million. The estimated expenditures also have been increased by 5 percent from US$34.4 million to US$36.0 million. The estimated surplus for 2004 will increase from US$0.1 million reported in the previous MTP to US$0.5 million. This expected surplus will allow to CIAT improve the reserves level.

Compared with 2003 figures the unrestricted funding will increase 14 percent, mainly because The United Kingdom and New Zealand moved their contribution from restricted to unrestricted and additionally both The United Kingdom and New Zealand increased their contributions.

The higher devaluation of the Colombian peso until 2002 permitted significant costs savings, however for 2004 the trend has changed and now there is a revaluation of 9 percent, which imply additional costs mainly in the national recruited staff costs and purchase of supplies and services in the local market.

Program Expenditures 2004

With respect to the last MTP submission, the Confronting Global Climate Change project has been merged into the *TSBF/Overcoming Soil Degradation* project.

Three projects (Conservation and Use of Tropical Genetic Resources, Bean Improvement for the Tropics and Participatory Research and Gender Analysis) have considerably increased their activities with restricted funding. TSBF-Overcoming Soil Degradation increased by the merging with the Climate Change project, and the Communities and Watersheds project decreased by the decision of the donor, USAID, to reduce the Haiti project due to policy shifts in regional priorities.

In terms of CGIAR outputs compared with the 2003 figures, Sustainable Production decreased from 34 percent in 2003 to 32 percent in 2004. Germplasm Improvement increases from 31 percent to 32 percent. Germplasm Collection also increases from 15 percent to 16 percent and Enhancing NARS and Policy were stable at 15 percent and 5 percent respectively. These minor variations reflect small differences in the patterns of donor restricted funding and do not represent strategic shifts.

By region, expenditures in Latin America and the Caribbean stabilized at 48 percent. Sub-Saharan increased from 36 percent in 2003 to 37 percent. Expenditures in Asia decreased from 15 percent to 14 percent. These minor variations reflect differences in expected rates of project implementation rather than strategic decisions.

By object of expenditures, overall personnel costs represents 50 percent for 2004, compared with 53 percent in 2003. Supplies and services including the Support to Partners increase to 38 percent (37 percent in 2003). Travel expenditures increase to 8 percent (7 percent in 2003) and the depreciation costs decrease to 3 percent (4 percent in 2003). In absolute terms personal costs increase US$0.6 million from US$17.4 million in 2003 to US$18 million in 2004. Supplies and Services increased US$2.5 million from US$11.3 million to US$13.8 million.

Financial projections for 2005—2007

As with previous submissions, the MTP projection for the following 3 years is extrapolated on the basis of the current year. Some changes have been incorporated in the Harvest Plus Program to include the CIDA and DFID contributions to this Program. Income for 2005-2007 is projected to be $37.5 million, 3 percent higher than 2004. Expenditures are projected to be US$37 million, also 3 percent higher than 2004.

Investment by CGIAR Output

Sustainable Production will decrease to 30 percent, Germplasm Improvement increases to 32 percent and Germplasm Collection to 17 percent. Enhancing NARS will maintain at 15 percent and Policy increases to 6 percent. These minor variations reflect shifts in patterns of restricted funding rather than strategic decisions.

Appendix I

Project Description and

Log Frames for 2005-2007

CIAT - DEVELOPMENT CHALLENGE I. SHARING THE BENEFITS OF AGROBIODIVERSITY LOG FRAME (2005-2007)

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute diminishing the risk of genetic collapse of crops by producing, preserving and disseminating germplasm specifically adapted to multiple biotic and abiotic stresses in the tropics.	# of endangered mandated-crops species took off the lists by 2010. # of new mandated-crop varieties released by 2007. # of new accessions preserved in the germplasm bank by 2007.	FAO listings on endangered species. CIAT's Annual report. CIAT's Gene bank database	
Purpose To contribute to the sustainable increase of productivity and quality of mandated and other priority crops, and to the conservation of agrobiodiversity in tropical countries.	Germplasm and Genetic stocks available to CIAT partners. # of CIAT scientists and partners using biotechnology information and tools in crop research.	Genetic stocks database. CIAT and NARS publications. Statistics on germplasm exchange. Reports and project proposals.	Farmers use the new technologies to preserve agrobiodiversity.
Outputs 1. Characterized agrobiodiversity, improved crop genetic stocks, and modern molecular and cellular methods and tools are used by CIAT and NARS scientists for improving, using, and conserving crop genetic resources.	A database produced on diversity of wild and cultivated species by 2006. Mapped economic genes and gene complexes by 2008. Improved genetic stocks, lines, and populations used by NARS and farmers by 2007.	End-of- year reports. Refereed publications, book chapters. Adoption and impact studies.	Pro-active participation of CIAT and NARS agricultural scientists and biologists.
2. Bean productivity is increased through enhanced access and utilization of improved cultivars and management practices in partnership with NARS, regional networks, and farmers.	NARS, and farmers in 40% of Latin America and 15% of African network countries by year 2005 use improved cultivars and/or ICM. Adopting farmers increase bean income by 10% by 2009. Regional networks in LAC and Africa devolved to local management, with CIAT as a research partner by 2007.	Reports of NARS and regional networks. Adoption survey reports. Publications. CIAT reports. End-of-project and evaluation reports	Core researchers and budgets maintained. Continued donor support to regional networks. Resources in challenge programs accessed. Regional bodies and national governments continue to give priority to bean production.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
3. Identification of valuable germplasm, methods and tools that will make the genetic improvement of cassava more efficient developed.	By the end of year 2006, the project has consolidated the technology packages for alternative industrial uses of cassava as well as strengthened the reliability and sustainability of the crop as a source of food security for subsistence farming. A technology package involving germplasm, cultural practices and processing alternatives will be made available to rural communities by 2009.	Reports and project documents of our partner institutions. Reports from the processing sector. Scientific publications	Political and institutional support for sustainable rural and agricultural development at the reference sites and targeted countries is maintained. Natural disasters and civil strife do not impede progress toward contributing to the project's goal. Absence of drastic changes in the price of maize as a commodity that greatly affects cassava competitiveness.
4. Robust high yielding rice varieties requiring lower inputs are produced by providing well-characterized progenitors and advanced materials with an ample genetic base as well as training to our partners.	Monitoring of yields of new varieties that were developed using our improved germplasm in 2005. # of new rice varieties released in 2007. % Reduction in pesticide use and lower costs of production due to adoption of ICPM practices leading to stable production and a cleaner environment by 2007.	Impact assessment reports Yields and areas of rice production Production practices and pesticide use	Stability (internal and external) National policies favor adoption of new technology.
5. Superior gene pools of grasses and legumes for sustainable crops-livestock systems in sub humid and humid tropics are delivered to farmers	Demonstrated economical and ecological benefits of multipurpose grasses and legumes to livestock and crop farmers in tropical regions of Latin America, Africa and South East Asia by 2007	Range of genetic variation in desirable plant traits Performance of forage components in systems.	Support from traditional and nontraditional donors Effective collaboration with CIAT's Projects ARO's, partners and farmers, NGOs
6. Information and support for the promotion of production, processing, and marketing of tropical fruits are provided to partners in the public and private sectors.	*What to Grow Where* databases and software being used by farmer groups, entrepreneurs, and development agencies in use by 2006. Agribusiness opportunities based on matching market demand with potentially growable crops identified for specific populations (regions) by 2005. # of exotic fruit species (crops) introduced, based on *What to Grow Where*, into commercial production	Web site. Documentation of satisfied requests for support in developing fruit-based agribusiness. Documented cases of introduction of exotics. Documented use of new technologies and beneficial effects.	Collaboration and support from other CIAT units. Markets for new products. Germplasm available. Active and effective collaboration between local, national, and international institutions. Logistical and administrative support with CIAT.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	schemes. # of specific new technologies commercially used.		
7. Knowledge systems and pest-and-disease management components for sustainable productivity and healthier environments developed and transferred.	# germplasm accessions with resistance to biological constraints by 2007. Establishment of released natural enemies in selected areas by 2007. Use of environmentally friendly control strategies in selected sites by 2006. Improved understanding of major biotic constraints by 2005.	End-of-project reports. Refereed publications, book chapters. Adoption and impact studies.	National policies favorable to adoption of IPM strategies (i.e., increased support to extension, reduction of subsidies for pesticides). National programs are active and strong in key countries. Active collaboration from other IARCs and DC research organizations. Active collaboration from AROs
8. Insights to biological limitations and drivers of land use change developed from spatial analysis of agrobiodiversity. .	Threats of global climate change (GCC) to regional crop production defined for regions. Threats of climate change in specific environments to plant genetic resources defined. Opportunities for improved genetic resource management defined for regions. Homologue, FloraMap and MarkSim user community established. Management decisions based on the use of these tools.	Maps and databases completed. Models developed, calibrated, verified, and published. Projects developed to apply models.	Sufficient data are available to generate insights.

PROJECT SB-2: CONSERVATION AND USE OF TROPICAL GENETIC RESOURCES

PROJECT DESCRIPTION

Objective: To conserve the FAO Designated Collections and employ modern biotechnology tools to identify and use genetic diversity for broadening the genetic base and increasing the productivity of bean, cassava, rice and *Brachiaria.*

Outputs:

1. Improved characterization of the genetic diversity of wild and cultivated species and associated organisms.
2. Genes and gene combinations used to broaden the genetic base.
3. Increased efficiency of NARS breeding programs using biotechnological tools
4. *Phaseolus, Manihot,* and forage species conserved, multiplied and distributed as per international standards.
5. Germplasm available, restored, and safely duplicated.
6. Designated Collections made socially relevant.
7. NARS strengthened for conservation and use of Neotropical plant genetic resources.
8. Conservation of Designated Collections linked with on-farm conservation efforts and protected areas.

Milestones:

2005 Efficient transformation system developed for cassava.
Characterization of the bean core collections with 50 genomics and gene based microsatellite markers.
Characterization of a basic collection of tepary bean germplasm with AFLP.
1500 accession from the cassava collection genotypes with 36 SSRs markers.
Bean with high iron and zinc tested and transferred to CIAT-Africa program for bioavailability testing.
Survey of cassava germplasm for beta-carotene.
SNP markers developed for bean and rice.
Targeted sequencing of cassava genome.
Molecular markers developed for dry matter content and resistance to cassava green mites.
Isogenic of QTL in rice developed and tested.
Gene expression studies for insect resistance in Brachiaria.
Differentially expressed genes for adaptation of Brachiaria to acid soils isolated by microarray.
Bean cDNA libraries for drought generated.
Comparison of gene flow in bean and rice under controlled and field conditions.
Technology for rapid propagation system transferred to NARS.
Testing of rice T-DNA populations for gene identification.

2006 Scaling up of marker-assisted selection and genetic transformation established for rice, bean and cassava.

Marker assisted selected for multiple traits implemented in beans, rice and cassava. Target genes for drought identified and tested in beans.
High iron and zinc bean lines developed through markers assisted selection released for field-testing.
Beta-carotene cassava tested in Colombia, Brazil and selected countries in Africa.
High protein cassava lines developed and tested in Colombia and selected African countries.
Field-testing for transformed cassava with Bt gene and transformed rice with sheath blight resistance.
High through put propagation for selected tropical fruits initiated.

2007 Allele mining of *ex situ/in situ* collections of wild relatives of beans, cassava for genes of economic importance.
Gene flow studies diffused to NARS.
Candidate genes for drought tolerance identified for bean and rice.
Germplasm Upgrading Plan completed.
Safety duplicates at CIMMYT and CIP for bean and cassava germplasm.
Biofortified bean and cassava varieties in field-testing.
Methods for rapid multiplication of tropical fruit germplasm diffused to NARS.
Field-testing for cassava transgenic lines expressing inducible flowering genes for control of flowering in cassava breeding.

Users: CIAT and NARS partners (public and private) involved in germplasm conservation and crop genetic improvement and agrobiodiversity conservation; ARIs from DCs and LDCs, using CIAT technologies.

Principal Collaborators:

***Africa NARS*:**

DRC: Mvuazi Research Center (INERA), **Ghana:** Crop Research Institute (CRI), Kumasi; **Kenya:** University of Nairobi, **Malawi:** Chitedze Research Station, Malawi; **Nigeria:** National Root Crops Research Institute (NRCRI), Institute for Agricultural Research and Training (IAR&T), Ibadan; **Rwanda:** ISAR; **Tanzania:** Agricultural Research Institute (ARI); **Uganda:** Namunlonge Agricultural and Animal Research Institute, Kampala; Medical Biotech Laboratories, Kampala.

Latin American NARS and Universities:

Bolivia: CFP - Centro Fitogenetico Pairumani; **Brazil:** Embrapa-Cenargen, Embrapa-CTA, Embrapa-CNPAF, Embrapa-CNPMF, University of Campinas; **Colombia:** Cenicaña, Cenicafe, Universidad Javeriana, CIB, COLCIENCIAS, Colombian Ministry Agriculture and Rural Development, Corpoica, Corporacion Biotech, Colombian National Biosafety Council, FEDARROZ, ICA, Instituto Humboldt, UniAndes, UniValle, Universidad Nacional at Palmira and Bogotá, Universidad del Tolima; **Chile:** INIA, REDBIO; **Costa Rica:** University of Costa Rica; **Cuba**: INIVIT, **Dominican Republic**: IDIAF, National Bean Programs of the (INIAF)*;* **Ecuador**: INIAP, Universidad Catolica, **Honduras***:* Zamorano*;* **Mexico:**

Universidad Autonoma de Mexico, INIFAP; **Nicaragua:** Ministerio de Agricultura**;** **Peru:** INIA; **Venezuela:** Centro Tecnológico Polar, Simón Bolívar University.

***Colombia NGOs**:*

CEGA, FIDAR, PBA, REDBIO-Colombia, Latin America, Small Farmers from Pescador and Tierradentro-Cauca, Cauca farmers association, Parque del Software, Cali.

Colombia private sector:

Corn product, Barranquilla; Agrobios, Bogota: LIMSYS, Cali; DATABIO, Cali; Syngenta, Cali.

Asia NARS:

China: Academy of Agricultural Sciences (CAAS), SCIB; **India:** Central Tuber Crops Research Institute (CTCRI) Thiruvananthapuram, Kerala; **Thailand:** Rayong Field Research Center.

Biodiversity Institutes:

Colombia: Instituto Humboldt; **Costa Rica:** Inbio; **Mexico:** Conabio; **US:** Smithsonian Museum of Natural History

Advanced Research Institutes:

Australia: Center for Applied Molecular Biology in International Agriculture (CAMBIA)

Europe: **Belgium:** University of Ghent; **Denmark:** University of Aarhus; **France:** CIRAD, Genoplants, IRD, INRA, Universite de Perpignan; **Germany:** University of Freiburg, University of Hanover, University of Hohenheim, Federal Biological Research Centre for Agriculture and Forestry (BBA); **Netherlands:** PRI-Wageningen; **Sweden**: USLU, Uppsala**; Switzerland:** Universite de Geneve, ETH; **UK**: University of Bath; **Japan:** JIRCA-Tsukuba; **United States:** Clemson University, Cornell University, Danforth Center, Kansas Sate University, Louisiana State University, Michigan State University, National Center for Genome Research, (NCGR), Ohio State University, Penn State University, Rutgers University, Smithsonian Molecular Systematic Lab, University of Nebraska, University of Puerto Rico; University of Chicago, USDA-Plant Soils and Nutrition Lab at Cornell University, USDA at Children Hospital Baylor University, USDA-Soybean Genomics, at Beltsville, Yale University.

Regional networks:

ASARECA, SACCAR, AfNet, ECABREN and SABRN (Africa); SIGTTA (Central America); REDBIO (Latin America); CATIE and EAP-Zamorano (Central America), Cassava Biotechnology Network (CBN-LAC); FLAR, CLAYUCA.

***CGIAR, and International organizations**:*

CIP, CIMMYT, FAO, IAEA ICARDA, ICRISAT, IFPRI, IITA, IPGRI, IRRI, TSBF, WARDA.

CGIAR Challenge Programs:

HarvestPlus; Generation

CGIAR system linkages: Saving Biodiversity (40%); Enhancement & Breeding (55%); Training (4%); Information (1%).

CIAT project linkages: *Inputs to SB-2:* Germplasm accessions from the gene bank project. Segregating populations from crop productivity projects. Characterized insect and pathogen strains and populations from crop protection projects. GIS services from the Land Use Project. *Outputs from SB-2:* Management of Designated Collections (gene banks); genetic and molecular techniques for the gene bank, crop productivity, and soils (microbial) projects. Identified genes and gene combinations for crop productivity and protection projects. Propagation and conservation methods and techniques for gene banks and crop productivity projects. Interspecific hybrids and transgenic stocks for crop productivity and IPM projects.

CIAT: SB-2 PROJECT LOG FRAME (2005-2007)

PROJECT: CONSERVATION AND USE OF TROPICAL GENETIC RESOURCES
PROJECT MANAGER: JOE TOHME

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute to the sustainable increase of productivity and quality of mandated and other priority crops, and to the conservation of agrobiodiversity in tropical countries.	# of CIAT scientists and partners using biotechnology information and tools in crop research. Germplasm and Genetic stocks available to key CIAT partners.	CIAT and NARS publications. Statistics on germplasm exchange.	
Purpose To conserve the genetic diversity and ensure that characterized agrobiodiversity, improved crop genetic stocks, and modern molecular and cellular methods and tools are used by CIAT and NARS scientists for improving, using, and conserving crop genetic resources.	A database on diversity of wild and cultivated species. Mapped economic genes and gene complexes. Improved genetic stocks, lines, and populations.	Publications, reports, and project proposals.	Pro-active participation of CIAT and NARS agricultural scientists and biologists.
Output 1 Genomes characterized of wild and cultivated species of bean, cassava, rice and Brachiaria and of associated organisms.	*Molecular Genetic Techniques and molecular information on diversity*		
	2005: SNP markers for bean and rice developed.	Method available, Publication of SNP primers and protocols	Availability of up-to-date genomics equipment Collaboration with NARS maintained and expanded
Development of genome-wide anchored PCR based markers for marker assisted selection, germplasm characterization, and fine mapping, and gene flow analysis.	Characterization of core collection and national collections of bean with fifty genomic and gene-based microsatellite markers.	Reports on marker analysis and articles describing the genetic structure of the bean and cassava core collection of the world germplasm collection vis-à-vis other accessions of the collection.	
Identification and mapping of useful genes and gene combinations for agronomical and nutritional traits.	Characterization of a basic collection of tepary bean germplasm with AFLP and microsatellite markers.		
Markers assisted selection for multiple traits for bean, cassava and rice	1500 cassava accessions genotyped with 36 SSR markers.	Availability of a laboratory information management system (LIMS). Reports and primers made available in	

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Bioinformatics tools for data mining	Cassava core collection screened for carotenes and true retention of carotenes after processing determined LIMS developed and implemented 2006-07 Cross-legume and single-nucleotide polymorphism markers in CIAT mapping population integration of legumes cross-collection diversity data Selection of a set of genes for the development of cassava COS markers *Identification and mapping useful genes and QTLs for agronomical traits in bean, cassava, rice and Brachiaria* 2005 QTL analysis completed in two bean populations for nutritional traits including iron, zinc and tannin content Molecular markers tightly linked to CMD resistance identified and BAC library of TME3 constructed Two advanced backcross with wild AA Oryza genomes genotyped and QTLs for yield component in rice identified Generation of rice mapping populations for nutritional traits including iron and zinc	databases Genes suitable for the development of COS markers in cassava databases. Articles describing molecular markers associated with agronomical traits. Populations, markers and BAC library available for distribution and further analysis by partners Publications, reports, and data on population posted on web. Databases shared Map position sof targer genes indicated	

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	2006-07 QTL analysis completed on two populations of common bean for drought traits and nutritional traits. One advanced backcross populations (BC2F5) from wild beans is genotyped to determine if nutritionally superior genotypes can be obtained. Integration of drought and nutrition QTLs across multiple populations Populations segregating for dry matter, cyanogenic glucosides content, leaf retention, resistance to hornworm developed, characterized and evaluated with molecular markers QTL analysis completed on one population for Al tolerance in *Brachiaria*.		
Output 2 Genomes modified: genes and gene combinations used to broaden the genetic base of crops (bean, rice, and cassava) and forage species (*Brachiaria*) Identification of points of genetic intervention and mechanism of plant stress interaction Improved methods for genetic transformation for bean, rice and cassava Develop and obtain gene constructs for traits related to plant disease-insect resistance, plant stress and	*Candidate genes identified for agronomical traits* 2005 Cloning of candidate genes involved in tolerance to acid soils: full length cDNA libraries developed; Differentially expressed genes isolated by microarray Molecular characterization of spittlebug insect resistance in Brachiaria using cDNA subtractive differential expressed libraries Comparative genomics and gene	Publications, reports, and project proposals. Germplasm Libraries and candidate genes available Libraries and candidate genes available Libraries and candidate genes available Microarray chips available for	Phenotypic-biochemical analysis conducted prior to molecular analysis

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
nutritional traits. Acquisition of rice T-DNA and Ac/Ds mutants populations for testing and gene discovery Implement biosafety regulation for greenhouse and field condition	discovery drought in bean by gene expression profiling; cDNA libraries produced under drought conditions Cassava bacterial blight interaction characterized using cassava cDNA plant defense microarray chip of 6000 cassava unigene sets T-DNA rice 10000 mutants collections characterized under field condition 2006-07 Consolidated genes sequence data for drought and acid soils stress response pathways; gene chips for candidate genes developed; over 5000 genes arrayed and 25 candidate genes putatively related to drought tolerance identified Modification of flowering to increase the efficiency of breeding in cassava by using constructs for *LFY, AP1* and *FLC* flowering genes under the control of an ethanol-inducible promoter. Cloning of the cassava mosaic disease (CMD) resistance gene CMD2 by positional cloning *Transformation* 2005 Degree of gene flow from rice and bean into wild/weedy relatives measured in tropical centers of diversity. Identification, evaluation and diffusion of molecular markers for assessing rate and	distribution Characterization data made available on web. Databases Libraries and sequence made available. Databases Technical reports on sites and distribution of wild/weedy/ landraces, and cases of gene flow Number of advanced lines and crosses with RHBV resistant transgenic source Publications, reports, and protocols made available and published.	Continued access to biosafety field testing and collaboration with CIRAD, IRD and genoplantes Phenotypic-biochemical analysis conducted prior to molecular analysis Funding from Rockefeller Foundation, access to genes. IPR management to access genes and gene promoters. Biosafety regulations in place. IPR management to access genes and gene promoters. Biosafety regulations in place. Request extension of field permit to other field locations in Colombia approved IPR management to access genes and gene promoters. Biosafety regulations in place. Already received approval for field testing. Field Biosafety inspected and approved

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	direction of gene flow Field performance biosafety evaluation for agronomic traits of advanced generations of crosses between RHBV-N resistant transgenic rice and selected rice commercial varieties Transgenic *Agrobacterium* strains generated with constructs from JIRCAS containing different versions of *DREB* gene encoding for drought tolerance. Transgenic lines of cassava with Bt constructs and or rice with resistance to sheath blight tested under biosafety field conditions and evaluated for agronomical traits. 2006-07 Protocol developed for generating transgenic plants based on mannose selection system in place for rice and cassava Scaling up of rice and cassava transformation efficiencies; incorporating new genes, cultivars, and regeneration methods, and testing plants in the field. Field testing for rice and cassava transformed genotypes Optimization of bean transformation protocols Optimization of low cost alternative system using temporary immersion system principle in place for rice anther		

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	culture callus induction and plant regeneration for a scaling up system Adaptation and optimization of protocols for rice isolated microspore culture as an alternative for high efficiency generation of doubled haploids		
Output 3 Increased efficiency of NARS breeding programs using biotechnological tools	2005 Marker assisted selection for Cassava Mosaic Disease (CMD) transferred to NARS in Tanzania CIAT partners in LDCs using information and genetic stocks. LAC NARS involved in biofortification effort for iron, zinc and beta carotene Improved capacity of Colombian NARS to deal with biosafety 2006-07 New partnerships with private sector. Agreement on technology and gene constructs access	Publications. Training courses and workshops. Project proposals. Regional workshop MTA established and joint publication	Government and industry support national biotech initiatives. Freedom to operate obtained
Output 4 Bean, Cassava and forage species conserved and multiplied as per international standards.	2005 Germination rates for long-stored materials. Cost per accession/year, compared with other gene banks. 2006-07 Safety duplicates at CIMMYT and CIP for bean and cassava germplasm.	Visits to GRU substations and conservation facilities.	Absence of uncontrolled diseases. Quarantine greenhouse space available at different altitudes.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 5 Germplasm available, restored, and safely duplicated.	2005 Number of germplasm requests received and fulfilled annually. Low cost rapid propagation system for cassava implemented with farmer association Users received germplasm and data. 2006-07 Cryo-conservation technology developed, tested and implemented for cassava Users asked for novel germplasm and data.	Visits to multiplication plots. Reports on requests and delivery. Number of core collections multiplied and shipped.	Agreement with CIAT holds. CIAT becomes partner to the Treaty.
Output 6 Designated Collections made socially relevant.	2006-07 Landrace diversity restored to farmers. Farmers use new varieties. Breeders use novel genes.	Germplasm catalogs. Plant variety registration logs. National catalogs.	International collecting possible. Quarantine matters cleared.
Output 7 Strengthen NARS for conservation and use of Neotropical plant genetic resources.	2005 NARS germplasm collections conserved. Number of trainees trained at CIAT. 2006-07 Methods for rapid multiplication of selected tropical fruit germplasm diffused to NARS. Number of universities and NARS using training materials.	Country questionnaires. Courses registered. Distribution and sales of training materials. Protocols published	NARS and networks willing to cooperate.
Output 8 Conservation of Designated Collections linked with on-farm conservation efforts and protected areas.	Number of case studies and pilot *in situ* conservation projects.	Project documentation. Databases	NARS interested in conservation efforts. Farmers interested in conservation efforts.

PROJECT IP-1: BEAN IMPROVEMENT FOR THE TROPICS

PROJECT DESCRIPTION

Objective: To increase bean productivity through enhanced access and utilization of improved cultivars and management practices in partnership with NARS, regional networks, and farmers.

Outputs:

1. Higher and stable bean production with less dependency on inputs such as pesticides, fertilizers, and water.
2. Integration of traditional and advanced (e.g., marker-assisted selection) crop-improvement techniques and farmer participatory research approaches to facilitate rapid adoption of improved bean cultivars.
3. Institutional and organizational capacities of NARS, regional, and community organizations strengthened.
4. Increased access and adoption rates of bean based technologies through NARS, networks and farmers.

Gains: Improved varieties occupy 40% of bean area in Latin America and 15% in African network countries by 2005. Productivity and food security stabilized for poor rural and urban consumers in restricted areas. Pesticide use cut 20% in selected areas, reducing hazards to environment and health. Farmers growing new cultivars increase income from marketing beans by 10%-50%. Public and private researchers have access to beans with multiple-stress resistance and greater nutritional value. Research capacity strengthened through regional networks.

Milestones:

2005 Lines resistant to BCMV, BCMNV, stem maggot , root rots, CBB, anthracnose and angular leaf spot available to partners in Africa.
Drought tolerant lines validated with partners. Lines tolerant to low nitrogen and low pH developed. *Pythium* root rot pathogen in Eastern Africa characterized and distribution established.
ALS and *Pythium* resistance genes characterized.
Progeny from marker-assisted selection for P-efficiency made available to partners.

2006 Nutritional quality traits incorporated into high-yielding, stress-tolerant cultivars.
Heat tolerance incorporated into climbing beans.
Lines tolerant to low nitrogen, phosphorus and acid soil complex available to partners in Africa.
Method to quantify *Pythium* and Fusarium root rot pathogens in soil validated.
Improved varieties to reach about 3 million people in Africa.

2007 An IPM system for whiteflies on snap beans has been adopted in major bean producing areas of the Andean zone.

Gene combinations to manage major bean diseases and insect pests determined and deployed in improved varieties. Climbing beans adopted in at least 10 countries in Africa. Farmers growing new bean varieties realize a 10% increase in income from marketing beans.

Users: Small farmers in tropical America and Africa (mainly women) will obtain higher and more stable yields. Poor consumers, especially women and children, will benefit from low-cost protein and micronutrients. The environment and community at large will benefit from reduced pesticide and fertilizer use. Food legume researchers will access an enhanced knowledge base and germplasm.

Collaborators: *Regional networks*: ASARECA, SACCAR, AfNet, ECABREN and SABRN (Africa); SIGTTA (Central America). *NARS:* CORPOICA (Colombia), EMBRAPA (Brazil), and more than 30 other *NARs* in Latin America and Africa. G*ermplasm improvement:* NARS and farmers by FPR and PPB. *IPDM:* ICRAF, CIMMYT, IITA, CIP, TSBFI, partners in the Systemwide IPM program and African Highland Initiative (AHI). *Training in breeding and IPM:* Bean/Cowpea CRSP and ICIPE. *Diffusing technology:* NGOs, churches, relief and governmental agencies, and entrepreneurs. *International institutions:* CATIE and EAP-Zamorano (Central America), universities and other institutions in Australia, Belgium, Canada, France, Netherlands, Spain, Switzerland, UK, and USA. G*ene tagging*: CRSP and USDA.

CGIAR system linkages: Enhancement & Breeding (75%); Crop Production Systems (10%); Protecting the Environment (5%); Networks (5%); Training (4%); Information (1%).

CIAT project linkages: Germplasm (SB-1 / SB-2); IPM (PE-1), nutrient & water-use efficiency (PE-2), climate change (PE-6), communities & watersheds (PE-3), participatory research (SN-3), impact (BP-1).

CIAT: IP-1 PROJECT LOG FRAME (2005-2007)

PROJECT: **BEAN IMPROVEMENT FOR THE TROPICS**
PROJECT MANAGER: **STEPHEN BEEBE**

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To obtain a lasting increase in food availability and income for the poor through improved bean productivity.	% of increased bean production, Changes in income distribution. % increase of nutrition value through improved bean productivity.	National production statistics.	
Purpose To increase bean productivity through enhanced access and utilization of improved cultivars and management practices in partnership with NARS, regional networks, and farmers.	NARS, and farmers in 40% of Latin America and 15% of African network countries by year 2005 use improved cultivars and/or ICM. Adopting farmers increase bean income by 10%. Regional networks in LAC and Africa devolved to local management, with CIAT as a research partner.	Reports of NARS and regional networks. Adoption survey reports. Publications. CIAT reports. End-of-project and evaluation reports.	Core researchers and budgets maintained. Continued donor support to regional networks. Resources in challenge programs accessed. Regional bodies and national governments continue to give priority to bean production.
Output 1 Improved, small-seeded, bean germplasm resistant to major biotic and abiotic stresses with greater nutritional and market value.	2005 At least 40 breeding lines with BGMV, BCMV and anthracnose resistance plus drought tolerance available. Twenty lines resistant to stem maggot , or with two or more resistances to BCMV, BCNMV, root rots, CBB, anthracnose and/or angular leaf spot available to NARS, farmers and other partners (NGOs and community based organizations) in five countries in Africa (Uganda, Tanzania, Rwanda, DR Congo, and Kenya). Drought tolerant lines validated with partners in Nicaragua and available to four NARS in Africa (Kenya, Ethiopia, Tanzania, and Rwanda). Fifteen backcross progeny for enhanced nitrogen fixation delivered to Mexico.	Reports from NARS and regional networks. Annual reports. Publications.	Continued donor support to the African networks, LAC and CIAT. Continued input of (CIAT) breeders, molecular geneticist, and plant nutritionist.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	Ten lines tolerant to low nitrogen and low pH developed and made available to NARS in five countries in Africa (Malawi, DR Congo, Rwanda, Tanzania, and Kenya). 2006 High iron and zinc traits incorporated into at least 30 stress-tolerant breeding lines. Ten lines tolerant to low nitrogen and phosphorus and acid soil complex available to NARS, farmers and other partners in Africa (DRC, Kenya, Tanzania, Rwanda, Madagascar, Malawi, and Sudan). 2007 Approximately 30 F3-derived F5 families developed with tropical and temperate adaptation, 80% more minerals, abiotic tolerance and two resistances		
Output 2 Improved, large-seeded, bean germplasm resistant to major biotic and abiotic stresses with greater nutritional and market value.	2005 Lines resistant to BCMV, BCMNV, stem maggot , root rots, CBB, anthracnose and/or angular leaf spot available to partners in Africa. Fifteen lines resistant to BCMV and CBB available to NARS in Uganda, Tanzania, Rwanda, Sudan, and Kenya. Five lines resistant to root rots, anthracnose and angular leaf spot available to four NARS in Africa (Kenya, DRC, Uganda and Rwanda) 15 bush bean lines resistant to BCMV and / or anthracnose and angular leafspot available to NARS in Bolivia, Colombia, Ecuador and Peru	Reports from NARS and regional networks. Annual reports. Publications.	Continued donor support to African networks, LAC and CIAT. Input of breeder and molecular geneticist.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	2006: 15 climbing bean lines with heat tolerance distributed to NARS and network partners in Andean region, East Africa and Southern Africa Low phosphorus tolerance screened for in Andean beans. 2007: High iron and zinc traits incorporated into 15 new large-seeded lines mainly in the red mottled and red seed classes (everyone - please add to this one as you see fit). Five popping bean lines with BCMV resistance available to NARS in Bolivia and Peru (this one is optional and is not funded but was in our original milestones)		
Output 3 Strategies developed for managing diseases and pests in bean-based cropping systems.	2005 *Pythium* root rot pathogen in Eastern Africa (Kenya, Uganda and Rwanda) characterized and species distribution established. ALS and *Pythium* resistance genes characterized in 8 sources of ALS resistance and 4 sources of Pythium resistance. 2006 Method to quantify *Pythium* and Fusarium root rot pathogens in soil validated. 2007 An IPM system for whiteflies on snap beans has been adopted in major bean producing areas of the Andean zone. Gene combinations to manage ALS, BCMV and BGYMV determined for varietal improvement.	Reports from NARS and regional networks. Annual reports. Publications.	Continued input of pathologist, entomologist, and virologist. Continued donor support to whitefly IPM project.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 4 Improved cultivars and management practices developed, evaluated and widely disseminated in partnership with NARS, regional networks, NGOs, and farmers.	2005 Improved ISFM practices adopted in five countries by 7 % of farmers: composting, integration of inorganic and organic amendments, use of different types of green manures, crop residue management, integration of varieties tolerant to low soil fertility conditions in Kenya, DRC, Uganda, Rwanda and Tanzania. 2006 Improved IPDM practices adopted in five countries (Kenya, Malawi, Uganda, Sudan and Tanzania) by 7% of farmers Nationally facilitated strategic alliances established with NGOs interested in sustainable seed production approaches and with seed companies (where these exist) in about 14 countries in Eastern and southern Africa. Improved varieties or crop management technologies to reach about 3 million people in Africa. 2007 Farmers growing new bean varieties realize a 10% increase in income from marketing beans. – (Uganda, Ethiopia, Rwanda, DRC, Malawi) Climbing beans adopted in at least 10 countries in Africa (Rwanda, Uganda, Tanzania, Kenya, Malawi, Sudan, DRC, Zambia, Burundi, Madagascar, Ethiopia) and in Latin America (Bolivia, Colombia, Ecuador, Peru)	Trials on experiment stations and on farms. National statistics. Publications.	Continued donor support. Active collaboration with all partners involved, including farmers. Adequate support for socio-economic studies

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 5 Strengthened institutional, organizational and collaborative capacity of NARS and sub-regional networks in Africa and Latin America	2005: National bean seed consultations and partnerships established in Uganda, Rwanda, Malawi, Ethiopia, DRC, Kenya, Tanzania, Mozambique and Zambia to facilitate seed diffusion. Impact assessment of improved bean varieties backstopped by regional resource persons (from Uganda and Kenya) is completed in Rwanda, Tanzania, Ethiopia and Malawi. Guidelines and manuals for enhancing capacity and skills of NARS partners in participatory plant breeding, marker assisted selection and participatory monitoring and evaluation developed. Latin American networks with Central America, Mexico and Brazil revived around theme of biofortification 2006: Participatory monitoring and evaluation of regional bean research program within NARS established in at least 12 PABRA countries. Participatory plant breeding routinely applied in at least 12 PABRA countries (Kenya, Uganda, Ethiopia, Rwanda, Tanzania, Malawi, Uganda, Mozambique, DRC, Sudan and Zambia)	Reports from NARS, regional networks and PABRA. Annual Reports. PABRA reports,	Continued donor support. NARES scientists remain stable in their position. Partners commit resources to and incorporate innovative approaches

PROJECT IP-3: IMPROVED CASSAVA FOR THE DEVELOPING WORLD

PROJECT DESCRIPTION

Objective: To develop germplasm, methods and tools for increased productivity and value of the cassava crop that will result in increased income and development of rural communities involved in cassava growth and processing.

Outputs:

1. Genetic base of cassava and related Manihot species evaluated and available for cassava improvement.
2. Genetic stocks improved gene pools developed and transferred to national programs.
3. New methods for cassava breeding developed.
4. Research on the industrial uses of cassava and elite germplasm produced.
5. Breeding for insect and other arthropods and disease resistance and development of alternative methods for their control.
6. Development and use of biotechnology tools for cassava improvement.
7. Integrated cassava-based cropping systems in Asia. Widespread adoption of farming practices that enhance sustainability.

Gains: The rural populations in Africa, Asia and Latin America and the Caribbean benefit by increased productivity, enhanced value of the products produced, and flexibility by the availability of different processing alternatives for cassava.

Milestones:

2005 Consolidations of the first "Trapiches Yuqueros" (Cassava Drying Mills) in Colombia. A novel approach for cassava to promote rural development that could be replicated in other countries.
Development of an alternative breeding method based on the production of doubled-haploids and introduction of inbreeding in cassava genetic improvement.

2006 The first set of S2 lines planted in the field and evaluated for key traits such as starch quality and cyanogenic potential.
Better understanding of methods for the control of post-harvest physiological deterioration. First generation of crosses specifically designed for increased carotene content in the roots evaluated in Clonal Evaluation Trials in target environments.
First genetically modified cassava planted in the field following strict biosafety regulations.

2007 New molecular markers developed for resistance to white flies and mites, carotene content, and high dry matter content.
TILLING system implemented in mutagenesis project to produce and indentify cassava clones with novel starch properties.

Large number of crosses with wild relatives of cassava evaluated for key agronomic traits (insect and disease resistance, nutritional quality, extended shelf life of roots and acyanogenesis).

Users: Immediate beneficiaries are farmers growing cassava as a cash crop or for subsistence farming. Close beneficiaries are processing industries related to cassava (for animal feed, for processed food, for starch or derived products).

Collaborators: NARs in Asia (particularly in Thailand, Vietnam, China, India and Indonesia), Latin America (particularly Brazil, Colombia, Cuba, Dominican Republic, Haiti, Nicaragua, Peru and Venezuela), an Africa (Ghana, Ivory Coast, Nigeria, South Africa, Tanzania, and Uganda). IITA and IFPRI (CG Centers), CLAYUCA, and private sector involved in cassava processing. Advanced research laboratories (Danforth Center, Cornell and Ohio State University in the USA; Wageningen University in The Netherlands Uppsala University in Sweden, KVL University in Denmark and ETH in Switzerland).

CGIAR system linkages: IITA cassava breeding (5%); Biofortification Initiative (25%); Training (15%); Information (15%); Networks (20%); Organization and Management (10%). Participates in the Global Cassava Strategy (10%).

CIAT: IP-3 PROJECT LOGFRAME (2003-2006)

PROJECT: **IMPROVED CASSAVA FOR THE DEVELOPING WORLD**
PROJECT MANAGER: **HERNÁN CEBALLOS**

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To improve the livelihoods of rural populations in Latin America, Africa and Asia by increasing cassava productivity, while protecting the environment and enhancing the value of products derived from this crop.	Increased productivity of cassava clones. Widened uses for cassava. Increasing the area planted to the crop.	National statistics of different countries where projects have been implemented. Recognition of private sector (processing)	
Purpose To develop methods and tools that will make the genetic improvement of cassava more efficient and to identify valuable germplasm for the breeding project. Eventually a technology package involving germplasm, cultural practices and processing alternatives will be made available to rural communities.	By the end of year 2006, the project has consolidated the technology packages for alternative industrial uses of cassava as well as strengthened the reliability and sustainability of the crop as a source of food security for subsistence farming.	Reports and project documents of our partner institutions. Reports from the processing sector. Scientific publications	Political and institutional support for sustainable rural and agricultural development at the reference sites and targeted countries is maintained. Natural disasters and civil strife do not impede progress toward contributing to the project's goal. Absence of drastic changes in the price of maize as a commodity that greatly affects cassava competitiveness.
Output 1 Genetic base of cassava and related Manihot species evaluated and available for cassava improvement.	True retention of carotenes after processing determined (2004) and published (2005). Method for storage/shipment of roots determined (2004) and published (2005). Effect of carotene content on PPD determined (2004) and published (2005). Number of new clones and self-pollinations produced and evaluated combining high carotene content and desirable agronomic traits (2004-2007). Confirmation of stability of carotene, Fe and Zn contents in roots from selected clones determined (2004) and published (2005). Knowledge on the possibility of further	Articles published. Annual reports and project proposals. Clones developed to take advantage of findings from this output.	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Cassava germplasm bank is maintained in the field.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	increasing levels of carotenes through self-pollinations or specific crosses (2006). New generation of clones with higher carotenes or better agronomic performance (2007).		
Output 2 Genetic stocks improved gene pools developed and transferred to national programs.	Protein content in selected clones from Central America confirmed (2005). High and low amylose content in roots from selected clones confirmed (2005). Planting of 3000 genotypes induced for mutation (2004) production of self-pollinated seed (2005). Evaluation for starch quality (2006) and implementation of TILLING.	Project home page. Annual reports and working documents. Scientific publications. Shipment of germplasm to collaborators in different countries.	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Adequate funding for research activities.
Output 3 New methods for cassava breeding developed	Number of S_1, S_2 and S_3 seed produced and planted in the field (2004-2007). Six articles on inheritance of quantitative traits submitted for publication (2004-2005). Two scientific articles on cassava breeding submitted for publication (2004-2005). Analysis of the impact of the new evaluation/ selection scheme conducted (2004) and published (2005). Search of useful recessive traits in partially inbred germplasm incorporated as routine in the breeding project (2004-2007).	Case studies published. Annual reports and working documents. Submission of joint research proposals. Support from private sector	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Willingness of IITA to continue the collaboration we have had.
Output 4 Research on the industrial uses of cassava and elite germplasm produced	Number of germplasm produced and evaluated (2004-2007). Performance of elite germplasm identified (2004-2007). Number of officially released varieties. Area planted to cassava germplasm developed totally/partially by CIAT (2007). Number of *"Trapiches Yuqueros"* consolidated (2005). Information of alternative uses of cassava products developed by CLAYUCA from roots and foliage (2005).	Project proposals and reports. Accessions planted and maintained in the field. Introduction of new accessions	Natural disasters or civil strife do not impede progress toward achieving the project's goal.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	Progress to introduce artificial drying processes in other countries from Latin America (2007). Number of clones (vitroplants) or new genotypes shared with collaborating NARs and IITA (on a yearly base 2004-2007).		
Output 5 Breeding for insect and other arthropods and disease resistance and development of alternative methods for their control.	Number of germplasm evaluated for their reaction to insects and arthropods with emphasis in white flies and mites (2004-2007). Number of germplasm evaluated for their reaction to diseases with emphasis in bacterial blight, root rot and super elongation disease (2004-2007). Results of field studies to determine how and who transmits the frog skin disease (2007). Identification of the etiology of frog skin disease (2007). Number of crosses with wild relatives evaluated every year in search of resistance to pests and diseases (2005-2007)	Annual reports and working documents. Scientific publications. Development of commercial products for biological control of pests in cassava.	Natural disasters or civil strife do not impede progress toward achieving the project's goal. Adequate funding for research activities.
Output 6 Development and use of biotechnology tools for cassava improvement	More than 700 CMD resistant hybrids (10 plants per genotype) shipped to Africa (Tanzania, Nigeria, Uganda, and South Africa) and India. (2005). About 300 CMD resistant hybrids (10 plants per genotype) shipped to Tanzania, hardened and transferred to the field. Latin American germplasm transferred to the field in Ghana and Nigeria and evaluated for high protein content and resistance to pest and diseases. Field results on starch quality from a transgenic clone with waxy starch developed with anti-sense technology (2005-2006).		Natural disasters or civil strife do not impede progress toward achieving the project's goal. Adequate funding for research activities.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	Molecular markers for resistance to beta-carotene (2005) developed and validated with field data (2007). Molecular markers for resistance to dry matter content (2005) developed and validated with field data (2007). Molecular markers for resistance to mites developed (2005) and validated with field data (2007).		
Output 7 Integrated cassava-based cropping systems in Asia. Widespread adoption of farming practices that enhance sustainability	Research partnerships established in Laos and Cambodia (2005). Number of trials introducing new germplasm/ technologies established (2006). Number of communities adopting new germplasm/technologies in Laos and Cambodia (2006).		

PROJECT IP-4: IMPROVED RICE FOR LATIN AMERICA AND THE CARIBBEAN

PROJECT DESCRIPTION

Objectives: To add to the well being of the rice sector with emphasis on the resource poor rice farmers by increasing genetic diversity and the stability of high yielding varieties. These will require lower inputs, which will reduce the production costs, help protect the environment, and make rice locally available at a reasonable price.

Outputs:
1. Enhancing Gene Pools
2. Integrated Pest and Disease Management
3. Education and Rice Cultivation as a Vehicle to Alleviate Poverty

Gains: Robust high yielding rice varieties requiring lower inputs will be developed. We will provide well-characterized progenitors and advanced materials with an ample genetic base as well as training to our partners. The focus will be on developing the capability to increase the number of desirable traits in varieties. This will lower unit costs giving farmers higher profits as well as maintain rice as an affordable food for the consumers.

Milestones and Indicators

2005 *Output 1: Development of Improved Rice Genetic Resources*

To increase the diversity in new rice varieties, 100 populations of interspecific crosses that incorporated key traits, will be advanced two generations.

Genetic progress and gains for 20 populations enhanced by recurrent selection for different traits will be assessed.

Rice germplasm from our breeding activities will be evaluated by our partners in at least 11 countries. These populations will contain important agronomic traits including disease resistance; good yield potential, early vigor, water stress adaptation, etc.

To increase the nutritional value of rice, 200 advanced breeding lines will be evaluated for higher iron and zinc content.

Evaluation of existing germplasm and new crosses will be made to develop rice with better water use efficiency. The traits of interests will include earliness and tolerance to drought.

Gene flow studies will be published, giving policy makers more information to make regulatory decisions about transgenic rice.

Output 2: Integrated Pest and Disease Management

In five countries, studies to understand the dynamics of the rice blast pathogen will be conducted and the results will be used by breeders to develop rice varieties with durable blast resistance.

To better understand durable rice blast resistance, 225 RILs of O. llanos 5 will be evaluated using molecular markers. The outcome of these efforts will be to set up markers assisted selection (MAS) for rice blast.

To understand the genetics and set up MAS, the fine mapping of some genes involved in rice hoja blanca virus (RHBV) will be completed and published.

More than ten thousand rice lines will be evaluated for rice blast and RHBV resistance.
More than 100 isolates of sheath blight (*Rhizoctonia* spp.) will be characterized for virulence and genetic profiles.
Two rice populations will be analyzed using micro-satellite markers to identify sheath blight resistance genes.
Transgenic rice plants will be tested for resistance to sheath blight.

Output 3: Education and Rice Cultivation as a Vehicle to Alleviate Poverty
Two educational modules on rice management will be developed for the CIAT rice website
To rationalize pesticide use, two training courses in Integrated Pest Management will be conducted.
More than 40 rice lines will be tested with resource poor farmers using participatory methods in Central America.
To target the small farmers, two pamphlets on crop management will be printed.
A rice breeders network (Red Mega) will be initiated.
Training for more than 20 undergraduate and graduate students.
At least 5 publications in referred journals and 3 book chapters.

2006 *Output 1 Development of Improved Rice Genetic Resources*
MAS as a breeding tool will be tested for at least four disease and quality traits to determine its effectiveness versus costs.
Use identified sources of high iron and zinc to develop breeding populations with improved nutritional value.
From the interspecific populations one nursery with advanced lines with resistance to sheath blight will be sent to at least 10 countries for their evaluation.
Populations developed by recurrent selection that have resistance for rice blast, sheath blight, RHBV, and good grain quality will be sent to at least 10 countries for evaluation.
An impact study that monitors the use of the CIAT rice germplasm and the release of commercial varieties will be made and used to refine our rice breeding strategy.

Output 2 Integrated Pest and Disease Management
The fine mapping of genes involved in resistance to the *Sogata planthopper* will be completed and published.
Rice lines with combinations of resistance genes that confer stable resistance to rice blast will be sent to at least 10 countries.
Control strategies for the mite *S. spinki* will be tested in Central America and the Caribbean region.
More than ten thousand rice lines will be evaluated for rice blast and RHBV resistance.
Transgenic plants will be tested for resistance to sheath blight.

Output 3 Education and Rice Cultivation as a Vehicle to Alleviate Poverty
The red Mega rice breeders network will hold two workshops to select rice lines and exchange information.
Two new rice and sorghum varieties identified by resource poor farmers using participatory methods will be released in Central America.
Rice as one component in the agricultural community will be analyzed as a means to increase farmer's incomes.
Training for more than 20 undergraduate and graduate students.
At least 5 publications in referred journals.
A book on rice productions for Latin America will be published.

2007 *Output 1 Development of Improved Rice Genetic Resources*
Depending on the outcome in 2006, a MAS breeding program will be implemented for at least 6 disease and quality traits.
The lines with multiple disease and quality traits that were selected by partners will become advanced lines and place into Red Mega international observation nurseries.
A new micro-spore anther culture method will be adopted if it proves more efficient than the current anther culture method.

Output 2 Integrated Pest and Disease Management
If MAS breeding for RHBV works, the number of lines evaluated by field methods will be reduced.
The results from the gene combinations for rice blast will be used to define region specific breeding strategies.
New genes or sources of resistance to rice blast should be identified and incorporated into new breeding populations.
The fine mapping of genes involved in resistance to sheath blight will be completed and published.

Output 3 Education and Rice Cultivation as a Vehicle to Alleviate Poverty
A impact study over the use and adoption of the varieties selected through participatory methods will be made to refine the participatory breeding strategy.
Training for more than 20 undergraduate and graduate students.
Web and CD based training for IPM will be available.
At least 5 publications in referred journals.

Users: Rice researchers especially in Latin America. Ultimate beneficiaries are the LA rice farmers most of whom are small farmers, and the resource poor consumer who are eating rice because it is available and affordable.

Principal Collaborators: France CIRAD, IRD & Genoplante, FLAR, IRRI, WARDA, Japan JIRCAS, Korea RDA, Brazil EMBRAPA, Colombia FEDEARROZ & CORPOICA, Peru INIA, Venezuela INIA & DANAC, Cuba IIA, Nicaragua INTA, Bolivia CIAT Santa Cruz, Chile INIA, Uruguay INIA, Argentina U. Corrientes & U. Tucumán, China, US Universities: KSU, Cornell, Purdue, LSU, U. Arkansas, Texas A&M and Yale.

CGIAR system linkages: Enhancement and Breeding (50%); Protecting the Environment (20%); Saving Biodiversity (15%); Transfer of Technologies (10%); Crop Systems (5%). Linked to IRRI and WARDA.

CIAT project linkages: Germplasm conservation SB-1, genomics SB-2, participatory research SW-3 for upland in hillsides PE-3 and cropping systems SW-2 for the savannahs. Provide improved germplasm to PE-1 and PE-2.

CIAT: IP-4 PROJECT LOG FRAME (2005-2007)

PROJECT: IMPROVED RICE FOR LATIN AMERICA AND THE CARIBBEAN
PROJECT MANAGER: LEE CALVERT

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To add to the well being of the rice sector with emphasis on the resource poor rice farmers by increasing genetic diversity and the stability of high yielding varieties.	Increased rice production with farmers having more access to improved germplasm and information, and markets.	National production statistics Impact assessment reports	
Purpose To produce robust high yielding rice varieties requiring lower inputs, we will provide well-characterized progenitors and advanced materials with an ample genetic base as well as training to our partners.	Monitoring of yields of new varieties that were developed using our improved germplasm. Reductions in pesticide use and lower costs of production due to adoption of ICPM practices leading to stable production and a cleaner environment.	Release of new rice varieties Impact assessment reports Yields and areas of rice production Production practices and pesticide use	Stability (internal and external) National policies favor adoption of new technology.
Output 1 Development of Improved Rice Genetic Resources	The number of crosses produced using CIAT germplasm. The number of lines screened by us and our partners. Advance lines and new varieties with improved tolerance to biotic and abiotic stresses with good grain quality and physiological traits. The number of double haploid produced and used. The development and implementation of MAS in the breeding program.	CIAT, FLAR and NARS annual reports. Publications. Improved varieties released by partners.	Continued donor support. Maintaining multidisciplinary team
Output 2 Integrated Pest and Disease Management	Understanding components of resistance and virulence of rice blast, sheath blight, hoja blanca, crinkling disease, and other selected pathogens. Molecular markers associated and number of resistance genes for rice pathogens and pests.	CIAT, FLAR and NARS annual reports. Publications. Pest and disease resistant varieties released by partners.	Continued donor support. Maintaining multidisciplinary team

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	Crop management components developed. Using novel genes resistance to rice pathogens including hoja blanca and sheath blast.		
Output 3 Education and Rice 9Cultivation as a Vehicle to Alleviate Poverty	Number of communities participating New varieties and small equipment for rice Number of workshops and scientists trained. The activities of Red Mega The progressive development of the rice web pages The availability of educational materials on the web, Cds, pamphlets and books.	CIAT, FLAR and NARS annual reports. Publications. Impact assessment reports Monitoring the use of the Rice Web page	Continued donor support. Maintaining multidisciplinary team

PROJECT IP-5: TROPICAL GRASSES AND LEGUMES

PROJECT DESCRIPTION

Objective: To develop and utilize superior gene pools of grasses and legumes for sustainable agricultural systems in sub-humid and humid tropics.

Outputs:
1. Optimized genetic diversity for quality attributes, for host-parasite-symbiont interactions, and for adaptation to edaphic and climatic constraints, for legumes and selected grasses.
2. Selected grasses and a range of herbaceous and woody legumes evaluated with partners, and made available to farmers for livestock production and for soil conservation and improvement.

Gains: Defined genetic diversity in selected grass and legume species for key quality attributes, disease and pest resistance, and environmental adaptation. Known utility in production systems of elite grass and legume germplasm. New grasses and legumes will contribute to increased milk supply to children, cash flow for small livestock and non-livestock farmers, while conserving and enhancing the natural resource base.

Milestones:

2005 Validated a rapid screening method, with a capacity to evaluate 1000 genotypes in five days, to assess *Rhizoctonia* resistance in *Brachiaria* based on disease symptom development on inoculated, detached leaves, by comparison with disease reaction of intact plants. Comparison will involve at least 100 genotypes covering a full range disease reaction classes in the detached leaf test.

2006 A new *Brachiaria* hybrid (CIAT 36087, cv. Mulato-II) with better adaptation to acid soils and tolerance to dry season (50% higher dry season forage yield on acid soils than the current hybrid cultivar), and resistance/tolerance to at least three Colombian species of spittlebugs, and with 2-3 times higher seed yield available for release (50 tons of commercial seed available).

2007 A Decision Support Tool for targeting 200 tropical forage species to different environments and production systems in tropical regions is available.

Users: Governmental, nongovernmental, and farmer organizations throughout the sub-humid and humid tropics who need additional grass and legume genetic resources with enhanced potential to intensify and sustain productivity of agricultural and livestock systems.

Collaborators: National, governmental, and nongovernmental agricultural research and/or development organizations; SROs (Universities of Hohenheim and Göttingen, CSIRO, JIRCAS, ETHZ); private sector (e.g. Papalotla).

CGIAR system linkages: Enhancement & Breeding (30%); Livestock Production Systems (15%); Protecting the Environment (5%); Saving Biodiversity (40%); Strengthening NARS (10%). Participates in the Systemwide Livestock Program (ILRI) through special projects in Central America.

CIAT project linkages: Genetic resources conserved in the Genetic Resources Unit will be used to develop superior gene pools, using where necessary molecular techniques (SB-2). Selected grasses and legumes will be evaluated in different production systems of LAC, Asia and Africa using participatory methods (SN-3) to target forages (PE-4, SN-2) and to assess their impact (BP-1), and in rural livelihoods and in natural resources conservation (PE-2, PE-3, PE-6).

CIAT: IP-5 PROJECT LOG-FRAME (2005-2007)

PROJECT: TROPICAL GRASSES AND LEGUMES
PROJECT MANAGER: CARLOS E. LASCANO

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute to the improved welfare of small farmers and urban poor by increasing milk and beef production while conserving and enhancing the natural resource base	• New cultivars of grasses and legumes used by farmers. • Raised productivity of livestock and crops while protecting biodiversity and land in savannas, forest margins and hillsides	Statistics and case studies on socio- economic benefits and natural resource conservation in smallholder livestock farms in the subhumid and humid tropics	Policies are put in place by governments to favor sustainable livestock and forage development in marginal areas occupied by small farmers
Purpose To identify and deliver to farmers superior gene pools of grasses and legumes for sustainable crops-livestock systems in sub-humid and humid tropics.	• Demonstrated economical and ecological benefits of multipurpose grasses and legumes to livestock and crop farmers in tropical regions of Latin America, Africa and South East Asia	• Range of genetic variation in desirable plant traits • Performance of forage components in systems	• Support from traditional and nontraditional donors • Effective collaboration: • CIAT's Projects • ARI's, partners and farmers, NGOs
Outputs 1. Grass and legume genotypes with high forage quality attributes are developed.	• Determined the utility of legume mixtures for increasing protein supply in ruminants while reducing methane emissions 20% by 2005 • Selected at least 10 Brachiaria hybrids (sexuals) with high digestibility (>60%) and crude protein (> 10%) by 2006 • The little bag silage technology with selected forage species adopted by at least 100 small farmers in Honduras and Nicaragua, results in 20-30%% milk yield increase in the dry season by 2007	• Demonstrated differences under field conditions • Scientific publications • Annual Reports • Theses	• Effective collaboration with CIAT Projects (PE-2), AROs, partners and farmer groups

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
2. Grass and legume genotypes with known reaction to pests and diseases and interaction with symbiont organisms are developed.	• Validated a rapid screening method, with a capacity to evaluate 1000 genotypes in five days, to assess *Rhizoctonia* resistance in *Brachiaria* by 2005 • At least 10 *Brachiaria* genetic recombinants with combined resistance to at least three species of spittlebug in Colombia are available for regional testing in Central/South America by 2006 • At least three *Brachiaria* genetic recombinants with resistance to *Rhizoctonia* are available for regional testing in Central/South America by 2007	• Demonstrated differences under field conditions • Scientific publications • Annual Reports • Theses	• Effective collaboration with CIAT Projects (SB-1, SB-2), AROs, partners and farmer groups
3. Grass and legume genotypes with superior adaptation to edaphic and climatic constraints are developed.	• Two improved accessions of Vigna and one of Lablab multiplied (500 or 100 kg of seed produced, respectively) and distributed to two national partners (DICTA, INTA), one NGO (SERTEDESO), one farmer organization (Campos Verdes) one development project (GTZ), in Honduras and Nicaragua by 2005 • A new *Brachiaria* hybrid (CIAT 36087, cv. Mulato-II) with better adaptation to acid soils and tolerance to dry season (50% higher dry season forage yield on acid soils than the current hybrid cultivar), and resistance/tolerance to at least three Colombian species of spittlebugs, and with 2-3 times higher seed yield available for release (50 tons of commercial seed available) by 2006 • Defined the genetic variability for nitrification inhibition in at least 500 *Brachiaria* hybrids by 2007	• Demonstrated differences under field conditions • Scientific publications • Annual Reports • Theses	• Effective collaboration with CIAT Projects (SB-1, PE-2, PE-4), AROs, partners, NGOs and farmer groups

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
4. In partnership with NARS, superior and diverse grasses and legumes are evaluated and disseminated through participatory research.	• New market opportunities for processed forages assessed trough surveys to at least 100 farmers with and without livestock in Honduras and Nicaragua by 2005 • *Brachiaria brizantha* cv. Toledo seed produced (500 kg to 1 t) by one farmer enterprise (PRASEFOR). in Honduras by 2006 A forage production systems established with >5000 farmers in 4 countries of SE Asia supported by >50 experienced staff and key technical information about forage technologies and their development by 2006 • At least 5,000 ha of Brachiaria hybrid (Mulato II) planted in Colombia, Honduras, Nicaragua and Mexico by 2007 • Improved multipurpose grasses and legumes result in 20% more on-milk, and in 30% reduced labor requirements in benchmark sites in SE Asia by 2007.	• Promotional publication • Newsletters • Journal • Extension booklets • Surveys on adoption impact of new grasses and legumes: • Seed sold • Area planted • Production parameters • Environmental/socioeconomic indicators	• Effective collaboration with CIAT Projects (PE-2, SN-1, SN-2, SN-3, BP-1 and Ecoregional Program), partners, NGOs and farmer groups

PROJECT IP-6: TROPICAL FRUITS

PROJECT DESCRIPTION

Objective: To provide information and support to partners in the public and private sectors for the promotion of the production, processing, and marketing of tropical fruits by rural communities, and thus increasing wealth and improving welfare of current and future generations in the countryside.

Outputs:
At present almost all support is via the Colombian Ministry of Agriculture and Rural Development (MADR) and so the project focus reflects the needs of the MADR. Hence the plans established here are indicative of the directions in which we would like to move but are largely dependent on reaching satisfactory agreements with donors. Once the funding base is established the following outputs are expected:

1. Interactive Web-based information system in place for farmer groups, development agencies, and entrepreneurs to determine which tropical fruits would grow successfully in a given locale.
2. Tropical fruit-based business opportunities identified for targeted populations and/or areas by other agencies or CIAT projects, and input from tropical fruits for development of these opportunities.
3. Participatory selection and clonal propagation techniques developed for the selection of elite clones for commercial production in several fruit species.
4. Expertise developed on flowering control of fruits.
5. Two projects established in areas in which CIAT has special expertise, to satisfy specific needs of local organizations and add value to CIAT's Tropical Fruit Project.

Gains: Farmers, farmer groups, entrepreneurs, and development agencies will have information on those fruit crops that can be grown successfully according to agro-ecological similarities. The rural population will be able to identify new business opportunities by matching crops that can be grown in their area and demand different classes of product. Producers will have techniques for identification and multiplication of elite materials they themselves identify. Development agencies will be able to identify income-generating opportunities for targeted populations or regions.

Milestones:

2005 Database established with information on more than1000 neo tropical fruit crops.
Database linked to other existing databases with geographical information.
Provision of system to accept queries by external organizations to identify business opportunities.
Techniques for participative selection implemented on pilot scale with one fruit species (*Solanum quitoense*).

2006 Database expanded to include a total of 1500 fruits including species from Africa and Asia.
Fruits used as pilot scheme for information macro-project.

Commercial plantings of sour-sop (*Annona muricata)* established using elite lines selected using participatory approaches combined with clonal micro-graft propagation techniques.

2007 Transgenic flowering procedures established for one species (*Mangifera indica*). Techniques for clonal propagation developed with participatory selection of elite lines being used for the commercial multiplication of ten fruit species.

Users: Farmer groups, farmers, entrepreneurs, and any development agencies interested in increasing rural incomes in areas where tropical fruits may have a role to play; local research and development organizations; importers/exporters of tropical fruits.

Collaborators: Fruit gatherers and producers, national and international research and development agencies, developed and developing country universities, IPGRI, ICRAF, EMBRAPA, Univ. Florida, CORPOICA, MADR, Corporación Biotec, Universidad Catolica del Oriente (Colombia).

CGAR systems linkages: Enhancement & Breeding (25%); Crop Production Systems (25%); Protecting the Environment (25%); Training (10%); Information (5%); Organization and Management (5%); Networks (5%).

CIAT project linkages: Collaboration with Land Use (PE-4) for software development, access to databases, and management and pilot testing of the fruit/soil/climate queries. Identification of business opportunities in conjunction with Agroenterprises (SN-1). Participatory research and biotechnology (SB-2) and (SN-3) will collaborate with studies on selected fruits geared to identification and propagation of elite lines.

CIAT: IP-6 PROJECT LOG FRAME (2005-2007)

PROJECT: **TROPICAL FRUITS, A DELICIOUS WAY TO IMPROVE WELL-BEING**
PROJECT MANAGER: **JAMES H. COCK**

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To encourage rural communities in promoting production, processing, and marketing of tropical fruits in an environmentally sound manner, thus bringing wealth and improved welfare to current and future generations in the countryside.	% Increased sales of tropical fruits by rural communities. Environmental certificates such as ISO[1] 14000 obtained by fruit production chains.	Case studies, agribusiness reports, and personal testimonies on socioeconomic benefits perceived by rural communities. Case studies of production, processing, and marketing systems. Internationally accepted certificates of environmentally sound practices.	
Purpose To provide information and support to partners in the public and private sectors for the promotion of production, processing, and marketing of tropical fruits.	*What to Grow Where* databases and software being used by farmer groups, entrepreneurs, and development agencies. Agribusiness opportunities based on matching market demand with potentially growable crops identified for specific populations (regions). # of exotic fruit species (crops) introduced, based on *What to Grow Where*, into commercial production schemes. # of specific new technologies commercially used.	Number of hits on Web site. Documentation of satisfied requests for support in developing fruit-based agribusiness. Documented cases of introduction of exotics. Documented use of new technologies and beneficial effects.	Collaboration and support from other CIAT units. Markets for new products. Germplasm available. Active and effective collaboration between local, national, and international institutions. Logistical and administrative support with CIAT.
Output 1 Interactive Web-based information system in place for farmer groups, development agencies, and entrepreneurs to determine which tropical fruits can grow successfully in a given place: *What to Grow Where*.	# of funded projects on *What to Grow Where*. # of climatic homologues identified (2004). Pilot version of homologue tested (2004) Pan-tropical climate databases established (2004). Database with information on 1500 tropical fruits (2005). Web-based access to databases (2007). Database with 2000 tropical fruits (2008).	Documents and deposits in the bank. Demonstrations. Reports. Hits on Web site and follow-up surveys.	Donor(s)' interest in long-term projects with indirect impact. Available resources and effective collaboration with IPGRI and local organizations. Normal germplasm exchange.

1. The International Organization for Standardization issues the *ISO 14000 Certification* to environmentally sound enterprises.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 2 Fruit-based business opportunities identified for targeted populations and/or areas and development of these opportunities. Rural agroenterprises.	# of funded projects on rural business enterprises (2005). Agreements signed with partners within and outside CIAT (2005). 3 of successful cases of adaptation and adoption of technology from one region (continent) to another (2007). # of successful new agribusinesses established, using transferred technology (2005).	Documents and deposits in the bank. Visits to agribusinesses, business reports. Case studies. Reports.	Resources allocated to and collaboration with CIAT project PE-4. Note resources from core probably required as donor funding difficult. Free exchange of information and technology.
Output 3 Participatory selection and clonal propagation methodologies for selection and propagation of elite lines	# of lulo and sour-sop elite lines being grown by farmers (2006) # of elite lines of several species selected and propagated by farmers/producers. New technology developed by CIAT under contract to other agencies effectively used by the fruit business (2007).	Reports of local agencies.	Funding obtained. Willingness of farmers to introduce new fruits.
Output 4 Improved national research organization	New research policy documents approved in one country 2005. Positive feedback on use of information.	Documents and reports of expert meetings and consultants. Feedback and testimony from users.	Cooperation from Ministries of various countries.
Output 5 Flowering control of one species	A flowering protocol established	Project documents	Management support to obtain donor support. Donor

PROJECT PE-1: INTEGRATED PEST AND DISEASE MANAGEMENT

PROJECT DESCRIPTION

Objective: To develop and transfer knowledge systems and pest-and-disease management components for sustainable productivity and healthier environments, through the reduced or rational use of pesticides.

Outputs:
1. Pest and disease complexes described and analyzed.
2. Pest and disease management components and IPM strategies and tactics developed.
3. NARS' capacity to design and execute IPM research and implementation strengthened.
4. Global IPM networks and knowledge systems developed.

Gains: Increased crop yields and reduced environmental damage. Natural enemies of major pests and diseases evaluated. IPM developed, and tested and verified on farms. Increased knowledge of the biology and ecology of pests and diseases and of the damage they cause. Molecular characterization of major arthropod pests, pathogens and diagnostic kits made available for developing durable host plant resistant. FPR methods for IPM developed and implemented. Biological control agents established in new regions. Pests and diseases on additional food and fruit crops evaluated or characterized.

Milestones:

2005 Botanical and other traditional pesticides or control practices in beans evaluated by farmers.

Entomology

Cassava whitefly natural enemies identified.

Homopteran species (2) collected and reared and vector transmission studies initiated for cassava frog skin disease.

Complexes of soil borne pests associated with cassava identified in Colombia.

Entomopathogens for control of selected soil borne cassava pests identified (for white grubs and burrower bugs).

One hundred new *Brachiaria* hybrids with multiple resistance to spittlebug available.

Molecular markers for Mexican bean weevil (*Zabrotes subfasciatus*) resistance available in common bean.

Bean stem maggot tolerant bean varieties evaluated in farmers fields in Kenya, Malawi and Tanzania.

Pathology

Role of endophytic fungi in plant protection of forages defined and biocidal proteins of plant origin characterized. I

Identification of sources of different known rice blast resistance genes and microsatellite markers.

Identification of rice lines with tolerance to sheath blight pathogen and development of genetic crosses.

Quantification using bioassay method for bean *Fusarium* root rot pathogen in soil.
Pythium root rot pathogens on beans in Eastern Africa characterized and distribution established.
Common bean genotypes with resistance to angular leaf spot, *Phaeoisariopis griseola* identified.
Identification of rice blast resistance genes present in 200 Latin America rice cultivars.
Candidate genes for resistance to CBB and *Phytophthora* Root Rot of cassava identified.
Novel approaches in scaling up bean IPDM technologies evaluated in Eastern and Central Africa.
Virology
Molecular marker for one resistant gene to rice hoja blanca virus available.
Cassava frog skin disease resistance identified.

2006 Participatory IPM practices for control of cassava soil borne pests evaluated at pilot sites in Colombia.
Genetic studies of sheath blight resistance in rice and identification of molecular markers associated with resistance.
Entomology
Biological pesticides identified for whitefly (*A. socialis*) control on cassava and evaluated whitefly predators and parasitoids released and evaluated in farmers fields.
At least two commercial *Brachiaria* cultivars with multiple resistance to spittlebug developed.
Molecular markers for bean pod weevil derived from crosses between Mesoamerican *Phaseolus vulgaris* genotypes available.
Botanical and other traditional pesticides for bean pest management evaluated by farmers in Eastern and Southern Africa.
Pathology
In heritance of anthracnose (*Colletotrichum lindemuthiuanum*) resistance in Andean bean germplasm identified and elucidated.
Bacterial endophytes isolated from *Brachiaria* antifungal protein isolated from seeds of tropical forage legume.
Micro satellite markers associated with rice blast resistant genes (Pi-1, Pi-2, Pi-33, Pi-K, Pi-b, Pi-ta and Pi-ta2) identified and distributed to Latin America Rice Program.
Isolates of *Trichoderma*, a soil associated fungus; with beneficial characteristics identified for *Phytophthora* Root Rot (PRR) control in cassava.
Quantification molecular assay method for bean *Pythium* root rot pathogens in soil validated in Uganda under field conditions.
Selection of rice blast resistant lines advanced from crosses between Latin American rice cultivars and donors of complimentary resistance genes.

Virology
Additional characterization of the Reo-like virus associated with CFSD.
Developing capacity for diagnosis of citrus viruses.

2007 Biological pesticides for cassava soil borne arthropod pests developed (for burrower bugs and specified white grub species.
Brachiaria hybrids resistant to *Rhizoctonia* foliar blight developed.
Incorporation of genes conferring stable rice blast resistance using molecular markers assisted selection into rice breeding populations.
Development of rice breeding population incorporating genes conferring tolerance to the sheath blight pathogen though marker assisted selection
Biological pesticide for Moko or Banana Bacterial Wilt (*Ralstonia solanacearum* available).
Bioassay and molecular assay methods for bean *Pythium* and *Fusarium* root rot pathogens in soil validated.
Angular leaf spot and *Pythium* root rot resistance genes characterized and deployed in improved varieties in beans in Eastern, Central and Southern Africa.
Cassava whitefly (*A. socialis*) IPM technologies implemented in farmers fields using FPR practices.
IPM of soil borne cassava arthropod pests implemented on cassava and possibly other crops.
Whitefly IPM implemented with common bean farmers in Colombia and Ecuador.
Novel approaches in scaling up bean integrated pest and disease management technologies evaluated in Eastern and Southern Africa.
Farmer Participatory Research and technology development implemented in common bean production in Eastern and Southern Africa.
Pathology
Co-evolution of the anthracnose (*Collectotrichum lindemuthiuanum*) pathogen and common bean gene pools characterized.
Gene for antifungal protein cloned from tropical forage clitoria and characterized for use in transgenic plants.
Identification of resistance sources of phytoplasma associated with Cassava Frog Skin Disease (CFSD) using molecular markers.
Virology
Using resistance for Cassava frog skin disease more effectively.
Mild strain of Citrus tristeza virus tested for use a cross protection agent.

Users: Information on biodiversity in tropical agroecosystems, improved IPM components and technologies and knowledge systems will benefit NARS scientists, extension workers, farmers and consumers, by increasing crop yields and stabilizing production systems.

Collaborators: IARCs (IITA, ICIPE, CIP, ICARDA, AVRDC); AROs (e.g., CATIE, NRI, Crop and Food Research, BBA, DBT, ETH, IPP, CIRAD, IRD, John Innes Center, CRCTPP); Universities (Florida, Wisconsin, Cornell, São Paulo, Caldas, Palmira, Valle);

NARS (e.g., EMBRAPA, CORPOICA, ICA, INIAP, INIVIT, MADR, NARO, IDIAP, INTA); NGOs; private industries (ASOCOLFLORES, Palmas de Casanare, Palmar de Oriente, Biocaribe); PRONATTA; COLCIENCIAS, SENA, CLAYUCA, FLAR, Profrijol.

CGIAR system linkages: Crops (30%); Saving Biodiversity (20%); Protecting the Environment (40%); Strengthening NARS (10%). Whitefly and Participatory Methods Projects, and Soil Biota, Fertility and Plan Health in the Systemwide program on IPM.

CIAT: PE-1 PROJECT LOG FRAME (2005-2007)

PROJECT: **INTEGRATED PEST AND DISEASE MANAGEMENT**
PROJECT MANAGER: **ANTHONY BELLOTTI**

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To increase crop yields and reduce environmental contamination through the effective management of major pests and diseases.	Increased crop yields. Reductions in environmental degradation through adoption of improved technology. Reduction of losses to several major diseases.	**Production statistics.** Adoption and impact studies. Project reports.	
Purpose To develop and transfer knowledge systems and pest-and-disease management components for sustainable productivity and healthier environments.	Adoption of germplasm with resistance to biological constraints. Establishment of released natural enemies. Use of environmentally friendly control strategies. Improved understanding of major biotic constraints.	End-of-project reports. Refereed publications, book chapters. Adoption and impact studies.	National policies favorable to adoption of IPM strategies (i.e., increased support to extension, reduction of subsidies for pesticides). National programs are active and strong in key countries. Active collaboration from other IARCs and DC research organizations. Active collaboration from AROs.
Output 1 Pest and disease complexes described and analyzed.	2005 Reduction in cassava whitefly damage. Colonies of homopteran (1 or 2) species established. Biology determined (1species). Transmission studies carried out. Taxonomic identification of white grub and burrower bug species. Experimental data available. Detection of endophytic fungi in *Brachiaria* and distribution determined. A set of microsatellite markers associated with blast resistance genes.	**All areas: project reports, refereed publications, book chapters.** Reports with maps, economic damage, biological information. Analysis of experiments. Transfer of tools to seed health facilities. Molecular markers for pest and diseases available. Candidate genes for resistance identified.	NARS have the needed resources. Adequate interaction with other disciplinary scientists. **Successful experiments.** Continued development of new varieties that are commercially acceptable. Farmers have adequate access to extension agents, credit lines, and other factors that influence adoption. Collaboration with NARS possible. Evaluation, screening, and exploration sites accessible.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	A set of 20 rice lines with tolerance to sheath blight identified. Isolates of *Fusarium* and *Pythium* pathogens in beans characterized and identified to species. Physical marker available, documented by publication in the annual report and a journal paper. 2006 AFLP fingerprints for *C. lindemuthiuanum* generated. Experimental data available. Antifungal activity indicated on test fungus (*Rhizoctonia solani*) in *Brachiaria*. Practices to control *Phytophthora* Root Rot (PRR) validated by selected Colombian cassava farmers. Isolates of *Pythium* pathogens on beans characterized and identified. Data available for publication. Better diagnostic method and more information on the virus published in the annual report and journal paper. Diagnostic tools for citrus psorosis virus and citrus leprosis virus developed and available for certification programs. 2007 RAMS and AFLP data for *C. lindemuthiauanum* available. Antifungal protein gene identified and available in tropical forages. DNA sequences in gene bank for resistance to cassava frog skin disease reported and published.		

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 2 Pest-and-disease management components and IPM strategies and tactics developed.	2005 Taxonomic identification Entomopathogenic fungi or bacteria or nematodes; data from laboratory experiments available. Publications in journals. Analysis of field and greenhouse data. Levels of resistance confirmed in bean progenies. Five to ten tolerant bean varieties selected in farmers' fields and greenhouse evaluation. Experimental data available; resistant bean lines identified. Set of rice blast isolates with a virulence genes for corresponding resistance genes. DNA sequences in cassava gene bank reported. Extension service providers (50), and farmers (300) trained in Bean IPDM in Uganda and Rwanda. A list of sources of CFSD resistance will be available. The work published in the annual report and a journal paper. 2006 Agreement with commercial biopesticide industry established for product development. Two commercial *Brachiaria* cultivars with spittlebug resistance available to farmers. Levels of resistance confirmed in bean genotypes 500 common bean farmers in Malawi, 1500 in Kenya and 8000 in Tanzania evaluated botanical biopesticides and other pest management options. Distribution of rice nurseries with 50 potential donors of blast and sheath blight resistance to Latin American countries.	Analysis of experiments. Guidelines for IPM. Reports on field effectiveness and probability of adoption of components. Field-oriented brochures. Farmer participatory research implemented. Reports available.	Funding for research and technology (IPM) practices available. Stakeholders are willing to participate.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	2007 Three to four biological pesticides commercially available for farmers. Foliar blight resistant *Brachiaria* hybrids available. Multiplication and distribution of Latin American rice cultivars with complementary blast resistance genes incorporated. Implementation of marker assisted selection breeding program for sheath blight resistance in rice. Practices to control Moko of banana validated by selected banana farmers in Colombia. Research partners in Kenya and Rwanda trained and collaborate in *Pythium* root rot assays on beans. Angular leaf spot and *Pythium* resistant bean varieties available to Bean Farmers. The populations for genetic studies develop and F2 population analyzed for disease susceptibility and molecular markers. Results of study using several CTV mild strains to determine if they provide adequate protection.		
Output 3 NARS' capacity to design and execute IPM research and implementation strengthened.	2005 Five hundred farmers in Malawi, 1500 in Kenya, 8000 in Tanzania and 1000 in Uganda evaluated biopesticide and other pest management practices on common bean crop. 2006 Cassava, maize and onion farmers trained in management of soil borne pests (white grubs and burrowers bugs). Molecular markers associated with resistance identified in rice.	Reports on training courses. Concept notes and projects prepared with partners. IPM projects implemented	Trainees are keen to become trainers of farmer communities.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	2007 Combination of whitefly resistant cassava varieties and biological control agents available to farmers and farmers trained. Application of biopesticides and cultural practices by farmers. Hundred or more bean farmers and technicians trained in whitefly management. Combination of pest resistant bean varieties and biological control agents available to farmers and farmers trained. Awareness of IPM in beans created among policy makers and other stake holders (NGO's, private sector, schools, etc.). Farmers meetings, field days, exchange visits, publication of promotional material.		
Output 4 Global IPM networks and knowledge systems developed.	Network of researchers established. Preparation of Web pages and databases with relevant IPM information.	Electronically published Web pages and databases. Progress reports.	

PROJECT CP-1: HARVESTPLUS: BIOFORTIFICATION CHALLENGE PROGRAM

PROJECT DESCRIPTION

Objective: To develop nutritionally improved varieties of staple food crops consumed by the poor in regions suffering from the effects of micronutrient malnutrition, including superior agronomic attributes to improve the potential for adoption.

Breeding outputs in first phase of program (2005-2007):

1. Germplasm screened for high levels of Fe, Zn and beta-carotene.
2. Genetically diverse sources of high Fe, Zn and beta-carotene levels identified in germplasm.
3. Genotype by environment interactions understood, including effects of cultural practices and processing on micronutrient content.
4. Genetics of high Fe, Zn, and beta-carotene levels determined
5. Initial crosses of high-yielding, adapted germplasm with high Fe, Zn, and beta-carotene lines; for selected crops, promising varieties, identified from initial screening and crosses, released to farmers.
6. Farmer participatory breeding initiated.

Milestones:

2005 Germplasm identified in bank, among elite breeding lines, and in advanced backcross program with pinto, black and medium-sized red beans. Introduction of cassava clones with yellow roots underway in target regions in Asia, Africa and LAC. Crosses between selected sourced of high-carotene cassava in the roots and elite germplasm adapted to target areas begun.

2006 Bean with high iron and zinc tested and transferred to CIAT Africa program for bioavailability testing. Survey of cassava germplasm for beta-carotene. SNP markers developed for bean and implemented for MAS. Targeted sequencing of cassava genome.

2007 Scaling up of bean marker assisted selection and cassava transformation established. High iron and zinc bean lines developed through markers assisted selection released for field-testing. Beta-carotene cassava tested in Colombia, Brazil and selected countries in Africa

Users: Small farmers in tropical America and Africa, and Asia will obtain higher and more stable yields. Poor consumers, especially women and children, will benefit from low-cost protein and micronutrients. CIAT and NARS partners (public and private) involved in Biofortification Challenge Program and related projects; AROs from DCs and LDCs, using CIAT and other IARC technologies.

Collaborators: IARCs (CIMMYT, CIP, ICARDA, ICRISAT, IFPRI, UTA, IRRI); NARS (26 institutions from Asia, Africa and LAC are partners in the challenge program to date); ARIs and universities (USDA-ARS, USDA-PSNL, MSU, Emory, Cornell,

Freiburg, and others to be selected through competitive grants); Crop breeding and dissemination networks, such as PROFRIJOL, ECABREN and others; NGOs (including CARE, HKI, CRS, WV, MI); corporations and private organizations.

CGIAR system linkages: Increasing Productivity (60%); Protecting the Environment (10%); Saving Biodiversity (20%); Improving Policies (5%); Strengthening NARS (10%).

CIAT project linkages: *SB-2:* Germplasm accessions, segregating populations, genetic and molecular techniques for micronutrient content breeding, interspecific hybrids. *IP-I:* Advanced backcross program with select varieties adapted to target regions, molecular marker development; participatory methods in target regions. *IP-3:* Introduction of yellow and sweet-root cassava in BCP target regions, seed multiplication and distribution, genetic tools and techniques applied to cassava breeding for micronutrient content.

CIAT: CP-1 PROJECT LOG FRAME (2005-2007)

PROJECT: **CIAT HARVESTPLUS. - COMMON BEAN CROP ACTIVITY**

PROJECT MANAGER: STEPHEN BEEBE

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
Goal: To reduce micronutrient malnutrition among poor populations in Africa, Asia, and Latin America, thereby improving food security and enhancing the quality of life.			
Intermediate Goal: To develop and disseminate iron and zinc dense varieties of common beans in selected countries of Africa and Latin America.	**Indicators**: Bean lines with 80% more iron and 40% more zinc. Increased production of biofortified beans.	Bean composition reports. Farm production surveys.	Better nutritional traits combined with superior agronomic traits (e.g. drought resistance) motivate farmer adoption. No unfavorable traits associated with high mineral content. Efficient multiplication and distribution systems of biofortified varieties are in place.
Purpose: To improve the overall iron and zinc content of the diet in selected countries.	**Indicators:** Increased consumption of biofortified beans by at-risk populations.	Household food intake surveys.	Biofortified varieties consumed by target populations. Levels of iron and zinc in cooked beans are sufficiently high and bioavailable to improve iron and zinc status.
Outputs: Agronomically superior bean varieties, high in bioavailable iron and zinc, adapted to local growing conditions in selected countries.	**Milestones:** a) Biofortified varieties identified or developed, b) their performance and consumer acceptability documented, and c) approved for release by national seed boards.	Varietal registries.	

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
Activities: **1. Germplasm Screening** Collected and/or draw local improved varieties and landrace germplasm from national collections in DR Congo, Rwanda, Uganda, Tanzania, Malawi, and Kenya for subsequent screening for high mineral content. Similar activity in Brazil, Honduras, and Mexico. Screen for iron and zinc variation in 10 varieties of bean under on-farm conditions in Malawi, Tanzania, and Guatemala.	**Milestones:** *Yr 1*: Germplasm planted for production of seed for mineral analysis. *Yr 2*: Identification of landraces with up to 40% more iron than average materials.	Seed deposited in national germplasm collections. Seed distributed internationally. Reports on mineral analyses. M.Sc Thesis (screening work in Guatemala).	Seed can continue to move across borders with relative ease. Support from the Danish-International Plant Research Network continues for work in Malawi, Tanzania, and Guatemala.
Create a collection of other Phaseolus species and produce seed for analysis.	*Yr 2:* Accessions of *P. coccineus, P. acutifolius*, and /or *P. polyanthus* identified as having more than 100 ppm iron.	Project reports. Field books.	
Compile African and headquarter breeding program data on elite lines with exceptional agronomic traits for crossing with high mineral sources.	*Yr 2*: Low fertility lines tested for tolerance to Bean Stem Maggot. *Yr 2*: Elite heat tolerant climbing beans confirmed. *Yr 2*: Workshop with NARES held to review data on elite lines and to plan crosses.	Trip reports of CIAT staff. Workshop report.	
Determine iron and zinc content and speciation (using HPLC-ICP-MS techniques) in different seed tissues.	*Yr 3*: Iron and zinc content characterized and information available on where and how iron and zinc are deposited.	Project reports. Scientific publications.	Support from the Danish-International Plant Research Network continues.
Interchange elite lines for crossing among programs.	*Yr 2*: Elite lines shipped from Africa to Colombia.	Seed available in Colombia.	All seed health requirements can be met. Facilities available for quarantine of introductions.
2. Genotype by Environment (GxE) Studies Determine the effects of common practices such as Rhizobium inoculation, chemical fertilization with P and N, and liming on seed mineral concentration. Identify influence of climate through multi-site testing and dynamic modeling of bean	*Yr 1*: On going work on agronomic practices extended to other environments including farmers' fields. *Yr 2*: GxE study. *Yr 2*: Effect of soil pH elucidated in greenhouse pot trial.	Project reports. M.Sc theses (GxE study).	Appropriate M.Sc candidate identified. Support from the Danish-International Plant Research Network continues for work on climatic influence.

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
growth using crop-soil atmosphere models.	*Yr 3*: Climatic and soil influence on iron and zinc content in beans evaluated.		
3. Gene Discovery Determine the role of iron reductase in iron uptake and its effect on seed iron.	*Yr 1*: Recombinant inbred lines evaluated for iron reductase activity under contrasting iron regimes. *Yr 2:* Response of iron reductase to pH determined. *Yr 3:* Association between QTL for iron reductase and seed iron concentration determined.	Project reports. Scientific publications.	
Identify markers linked to genes for seed iron and zinc concentrations and the presence of polyphenols.	*Yr 2*: QTL for iron and zinc confirmed in two populations. *Yr 2*: QTL for polyphenols identified. *Yr 3*: First robust markers for mineral concentration ready for application in MAS. *Yr 4*: Gene sequence for seed iron concentration converted to marker for MAS.	Project reports. Scientific publications.	QTL are sufficiently stable over environments and of sufficiently large effect to warrant developing robust markers for MAS. Iron reductase is associated with seed iron concentration.
4. Breeding Create crosses for small seeded beans—that combine high iron with drought tolerance and disease resistance—and commercial grain and locally adapted parents.	***Yr 1*:** At least 100 hybrid combinations of high mineral concentration with agronomic traits effected.	Project reports. Field books.	

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
Evaluate small seeded populations in successive generations under fertility stress for ALS and anthracnose resistance, drought tolerance, and mineral concentrations.	*Yr 1:* ~500 F2 families identified with drought tolerance and potential for high minerals *Yr 1*: ~10 F3-derived F5 families combining 50% higher mineral content and drought tolerance developed. *Yr 3*: ~40 F6-derived F7 families combining 70% higher mineral content and drought tolerance developed. *Yr 4*: ~30 F3-derived F5 families developed with tropical and temperate adaptation, 80% more minerals, abiotic tolerance, and 2 resistances.	Project reports. Field books.	Climate permits selection of drought tolerant genotypes and the evaluation of materials under other non-drought conditions.
Purify high mineral trait from selections made from large seeded Andean types F5 families.	*Yr 2*: Large seeded lines with 50% more minerals.	Project reports.	
Create additional crosses in Andean types and select to combine high minerals with disease resistance and commercial grain type.	*Yr 1*: Best lines derived from CAL 96, CAL 143, and Cerinza crossed to elite lines and African cultivars. *Yr 4*: F7 lines available for distribution.	Project reports. Field books.	Climate permits advance and selection of superior lines for several traits.
Advance and select existing crosses with popular climbing cultivars.	*Yr 3*: Climbers with tropical adaptation and 50% more minerals.	Project reports. Field books.	Climate permits advance and selection of superior lines for several traits.
Cross elite climbing beans with heat tolerance, commercial grain, and resistance to BCNMV with high mineral sources.	*Yr 2*: Crosses of elite climber MAC lines with high mineral lines available. *Yr 4*: F4 families derived from new crosses.		
Distribute high-iron lines to NARES and farmers.	*Yr 1*: High mineral nursery of parental materials and landrace selections distributed to NARES in both LAC and Africa. *Yr 1*: First cycle selections of Andean types tested on-farm in Colombia. *Yr 3*: High mineral landrace selections delivered to farmers. *Yr 4*: Second cycle F7 lines distributed to NARES.	Partners' report on evaluation of materials. NGO plant and harvest on-farm trials. Farmer surveys indicate degree of satisfaction.	Seed importation requirements met by all.
New sources of high mineral beans created by crossing germplasm accessions and lines with high	*Yr 2*: Stable levels of 100 ppm iron attained in F6 lines.	Project reports. Field books.	No intransigent negative linkages in interspecific crosses.

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
accessions and lines with high concentration, including *P. coccineus*.	*Yr 2*: Interspecific crosses intiated with high mineral accessions of *P coccineus*. *Yr 4*: Lines derived from *P coccineus* contain 110 ppm iron.		
5. Retention and Consumer Acceptability See log frame for Human Nutrition.			
6. Bioavailability Determine iron and zinc bioavailability in two different bean lines with significantly different iron and zinc content using pigs as a model. Look at the in vitro degradation of phytate and the association between phytate and both iron and zinc bioavailability See also log frame for Breeding Objectives.	*Yr 3*: Iron and zinc bioavailability in pigs determined. *Yr 3*: In vitro method for studying the effect of phytate on mineral bioavailability in pigs established.	Project reports Scientific publications	Support from the Danish-International Plant Research Network continues.
7. Efficacy Pursue bioefficacy trial with the University of Nairobi to estimate the potential impact of high iron beans on iron status.	*Yr 2-3:* High and low iron beans produced and delivered for trial. Pilot phase executed followed by a feeding trial.	Project reports. Scientific publications.	Suitable test site with minimal malaria identified. Suitable local capacity for day-to-day supervision.
8. Reaching and Engaging End-Users Specific proposal under development. See log frame for Reaching and Engaging End-Users.			Availability of genotypes with higher mineral content for fast track distribution.
9. Management and Coordination Provide financial support and technical oversight to Harvest Plus bean activities in target countries.	Annual work plans. Funding for approved activities disbursed. Technical and financial reports pertaining to the funded work plans prepared.	Summary technical and financial reports of financial support provided to at least 3 national program partners of HarvestPlus bean activities.	
Coordinate HarvestPlus' global network of partners' bean activities.	*Yr 0*: Bean meeting in Naivasha, Kenya.	Annual technical and financial reports for HarvestPlus' global network of bean	

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
of partners' bean activities.	*Yr 1*: Convene organizational meeting among LAC partners under CIDA funded component. Integrate partner activities in the HarvestPlus bean program. Crop leader visits principal partners annually.	partners.	

Cost: 2004 (Year 1)—$410,955 2005 (Year 2)—$679,943 2006 (Year 3)—$872,743 2007 (Year 4)—$843,358

Collaborators: (AFRICA) Burundi : Institut des Sciences Agronomiques du Burundi (ISABU); Congo: Institut National de la Recherche Agronomique (INERA); Ethiopia: Ethiopian Agricultural Research Organization (EARO); Kenya: Kenya Agricultural Research Institute (KARI), University of Nairobi, Kenya Medical Research Institute (KEMRI); Malawi: Chitedze Agricultural Research Station; Rwanda; Institut des Sciences Agronomiques du Rwanda (ISAR); Tanzania: Selian Research Centre, Ilonga Agricultural Research Station; Uganda: National Agricultural Research Organization (NARO), AfriCare–CARE;
(LATIN AMERICA) Bolivia: Universidad St. Cruz de la Sierra; Brazil: Empresa Brazileira de Pesquisa Agropecuaria–EMBRAPA Arroz e Feijao; Colombia: Fundación para la Investigación y el Desarrollo Agroindustrial Rural (FIDAR); Costa Rica: University of Costa Rica; Cuba: Ministry of Agriculture–"Liliana Dimitrova" Experimental Station; Dominican Republic: Secretaría de Estado de Agricultura–Centro de Investigaciones Agrícolas del Sureste (SEA-CIAS); El Salvador: Centro Nacional de Tecnología Agropecuaria (CENTA); Guatemala: Instituto de Ciencia y Tecnología Agrícolas (ICTA), Universidad de San Carlos; Haiti: Organization for the Rehabilitation of the Environment (ORE), Centre Recherche de Agriculture; Honduras: Dirección de Investigación de Ciencias y Tecnología Agrícola (DICTA), Escuela Agrícola Panamericana (EAP); Mexico: Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP); Nicaragua: Instituto Nacional de Tecnología Agropecuaria–Centro Nacional de Investigación Agropecuaria (INTA-CNIA);
(AUSTRALIA, EUROPE, NORTH AMERICA) Denmark: University of Aarhus—Laboratory of Gene Expression,
The Royal Veterinary and Agricultural University—Dept of Agricultural Sciences, Environment, Resources and Technology and Plant Nutrition Laboratory, The Danish Institute of Agricultural Sciences, Dept of Animal Nutrition and Physiology; United States: USDA-ARS Plant, Soil and Nutrition Laboratory, Cornell University, USDA-ARS Children's Nutrition Research Center—Baylor College of Medicine
(CGIAR Centers) International Center for Tropical Agriculture (CIAT)

PROJECT: **CIAT HARVESTPLUS. - CASSAVA CROP ACTIVITY**
PROJECT MANAGER: HERNAN CEBALLOS

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
Goal: To reduce micronutrient malnutrition among poor populations in Africa, Asia, and Latin America, thereby improving food security and enhancing the quality of life.			
Intermediate Goal: To develop and disseminate ß-carotene dense varieties of cassava in selected countries of Africa, Asia, and Latin America.	**Indicators**: Increased production of biofortified cassava.	Cassava composition reports. Farm production surveys.	Better nutritional traits combined with superior agronomic traits (e.g. disease resistance) motivate farmer adoption.
Purpose: To improve the overall ß-carotene content of the diet in selected countries. If possible, combine high ß-carotene with high iron and/or zinc.	**Indicators:** Increased consumption of biofortified cassava by at-risk populations.	Household food intake surveys.	Biofortified varieties consumed by target populations. Level of ß-carotene in food made from cassava is sufficiently high and bioavailable so as to improve vitamin A status. Sensory properties of biofortified cassava are acceptable. Efficient multiplication and distribution systems of virus-free biofortified varieties are in place.
Outputs: Agronomically superior cassava varieties, high in bioavailable ß-carotene (eventually also iron and/or zinc), adapted to local growing conditions in selected countries.	**Milestones:** a) Biofortified varieties identified or developed, b) their performance and consumer acceptability documented, and c) approved for release by national seed boards.	Varietal registries.	
Activities: **1. Germplasm Screening (CIAT)** Contribute to developing a protocol for standardized quantification of carotenoids, iron, and zinc in cassava roots (see log frame for Food Science and Human Nutrition).	**Milestones:** *Yr 1*: Protocol developed for sampling through to data interpretation.	Project report.	
Develop a system for preserving root integrity during shipment and storage of samples to enable carotenoids and other nutrient quantification.	*Yr 1*: Carotenoids content of root chips stored at different freezing temperatures or freed dried over 24 weeks determined.	Project report. Scientific publication.	

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
nutrient quantification.			
Determine whether the antioxidant properties of carotenoids in roots delay/reduce post harvest physiological deterioration (PPD).	*Yr 1-2*: Association between PPD and carotene content under uniform environmental conditions determined.	Project report. Scientific publication.	
Determine the effect of different processing methods on carotenoids stability (see log frame for Food Science and Human Nutrition).	*Yr 1*: Collaborate on a stability and retention study.	Project report. Scientific publication.	Retention study will be done if stability is viable.
Build capacity to assay carotenoids using appropriate methods (see log frame for Food Science and Nutrition).	*Yr 1:* At least 2 laboratory analysts trained in the advanced laboratory (Brazil).	Training course report from participants.	
1. Germplasm Screening (IITA) Evaluate promising ß-carotene lines grown in multiple locations in the major cassava growing agro ecologies for pest and disease resistance and agronomic performance.	*Yr1-2*: Incidence and severity of disease symptoms and arthropod pest damage determined. *Yr1-2*: Harvest yield and its components, plant type, and canopy architecture determined.	Project report.	
Evaluate the ß-carotene, iron, and zinc content of roots of promising high ß-carotene varieties grown in multiple locations in the major cassava growing agro ecologies (see also log frame for Food Science and Human Nutrition)	*Yr1-2*: Composition of roots from multi-location trials determined. *Yr1-2*: Sensory evaluation of freshly harvested and cooked roots.	Project report.	
2. Genotype by Environment (GxE) Studies (CIAT) Studies on GxE, age of plant, and soil for carotenoids, iron, and zinc.	. *Yr 1*: 5-7 clones grown in diverse environmental conditions, including soils with varying zinc contents. Roots evaluated for carotenoids, zinc, and iron. *Yr 1-3*: Contrasting clones for iron and zinc recovered from germplasm bank (Yr 1), multiplied (Yr 2), and planted for evaluation (Yr 3) to confirm the true genetic basis for	Project reports. Scientific publication.	Understanding the relative influence of the environment on the amount of carotenoids, iron, and zinc expressed is important for a) modifying the growing conditions to enhance nutritional quality and b) devising a reliable system for precisely evaluating germplasm to identify

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
	the earlier results. *Yr 1-2*: Sequential harvesting of clones to measure the effect of plant age on the carotenoids content in their roots.		genetic superiority.
2. Genotype by Environment (GxE) Studies (IITA) Analyze multi-location data and assess GxE interactions and determine the genotypic stability of promising lines that have a high ß-carotene content.	*Yr 2-3*: Multi-location data on pest and disease resistance, agronomic performance, and food and nutritional quality collected.	Project reports.	This work will identify genotypes with broad or specific adaptation that can be targeted to different agro ecologies or environments.
3. Gene Discovery/Biotechnology (CIAT) Develop genetic stocks based on self-pollinated progenies.	*Yr 1*: S_1 and S_2 seed (one and two consecutive self-pollinations) from elite germplasm developed. *Yr 2*: Single plants evaluated for carotene content. DNA extraction and molecular markers studies begun. *Yr 3-4*: Cloning of plants selected the previous year analyzed. Additional molecular studies.	Project reports. Scientific publication.	This work is to gain knowledge about inheritance and to facilitate molecular studies in less heterozygous genetic backgrounds.
Genetically transform traditional clones that subsistence farmers like and use into high ß-carotene germplasm.	*Yr 1*: Improved protocol for genetically transforming cassava that can be applied to a wide range of cassava germplasm developed.	Project report on improved efficiency of transformation and recovery of regenerated transformed plants.	This may encourage farmers to use the new varieties, as they are often unreceptive to new clones.
4. Breeding (CIAT) Cross clones with yellow roots to yield recombinant germplasm. Evaluate and select for even higher ß-carotene levels and/or better agronomic performance.	*Yr 1*: Clones with high color intensity from Single Row Trials (SRT) identified. *Yr 2*: Progenies planted in Preliminary Yield Trials (PYT) selected. New generation of SRT. *Yr 3*: Selected progenies planted in Advanced Yield Trials (AYT) in at least two environments. New generation of SRT and PYT. *Yr 4*: AYT planted in at least four different	Number of crosses between clones with yellow roots. Number of clones with high yellow color intensity. Project report. Scientific publication.	

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
	environments.		
Combine improved nutritional characteristics with tolerance to drought.	*Yr 1-4*: EMBRAPA-CNPMF developed cassava germplasm combining high carotene content with enhanced drought tolerance.	Clones from Brazil shared with other collaborating institutions. Number of crosses made by each breeding project. Number of botanical seed shipped from Brazil.	
Breed to produce new germplasm with high ß-carotene content and higher iron and/or zinc.	*Yr 2-3*: Confirmation of genetic origin of the variation in iron and zinc from the above GxE studies lead to crosses to combine high ß-carotene with high iron and/or zinc. *Yr 3-4*: Single plants derived from recombinant seed evaluated.	Number of crosses made by each breeding project. Number of botanical seed produced by each breeding project.	
Vitroplants produced and indexed (certified to be disease-free).	*Yr 1:* Vitroplants from elite clones produced and indexed. *Yr 2-3:* Collaborating institutions ship the vitroplants from the elite clones to CIAT where they are multiplied, indexed, and shared with collaborating institutions.	Number of vitroplants produced. Number of clones indexed. Number of vitroplants shipped.	CIAT is able to multiply and index the vitroplants from the elite clones in a timely manner.
Multi-location evaluation/selection of high ß-carotene varieties.	*Yr 1:* Seed multiplication started in Haiti in collaboration with World Bank. *Yr 2:* Seed multiplication for Farmers' Participatory evaluations of cassava clones in NE Brazil. *Yr 2-4:* Farmers participatory evaluations in NE Brazil.	Project reports.	
Facilitate the exchange of a large number of genotypes by shipping botanical seed that do not raise phytosanitary concerns associated with vegetative cuttings or vitroplants.	*Yr 2-4:* Seed from crosses involving one or two parents with yellow roots shared between institutions (EMBRAPA-CNPMF and CIAT).	Number of botanical seed produced and shipped.	Legal authorities in Brazil authorize the shipment of the germplasm the cassava breeder has offered to share with collaborating institutions.
4. Breeding (IITA) Establish seedling nursery and screen segregating seed families of crosses of promising lines with the high ß-carotene root (generated in 2003), pest and disease	*Yr1-2:* Seedling nursery established from controlled crosses in African-adapted gene pools and maintained with more than 400 hybrids and selfed families. ß-carotene	Project reports.	Successful screening for iron and zinc completed under germplasm screening (IITA) in task 2 above.

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
resistance, and agronomic characteristics for further improvement in the ß-carotene, iron, and/or zinc content in roots.	content, pest and disease resistance, and agronomic characteristics evaluated. *Yr 2-4:* Selected *p*rogenies advanced to clonal trials for further evaluation for agronomic superiority and nutritional quality.		Promising lines with high ß-carotene and variable levels of iron and/or zinc will be combined.
Establish new hybridization blocks and cross selected elite lines with roots high in ß-carotene obtained from Latin America and African landraces to generate new breeding populations (F1 crosses, selfed progenies, backcross populations, and polycrosses) and further genetic improvement in high root ß-carotene, iron, and/or zinc content.	*Yr 2-3:* Selected and promising lines with high ß-carotene content, from earlier selections introductions from CIAT, and selected African landraces used to generate F1, selfed progenies, backcross populations, and polycrosses in hybridization blocks. *Yr 3-4:* Selected progenies advanced to clonal trials for further evaluation for agronomic superiority and nutritional quality.	Breeding populations available for evaluation, selection, and improvement in root ß-carotene content, agronomic, and food and other nutritional quality characteristics (including high iron and/or zinc contents), and adaptation to cassava growing agro ecologies in Africa.	
Distribute to NARES both high ß-carotene in vitro planting materials and their segregating seed families, obtained from the polycrosses generated in 2003, for evaluation and selection under local conditions.	*Yr 2-4:* In vitro plantlets with high ß-carotene distributed from IITA to collaborating partners for establishment and evaluation under local conditions. *Yr 3-4:* Segregated seed populations with high ß-carotene content and good levels of iron and/or zinc processed, packaged, and distributed from IITA to collaborating partners for establishment and evaluation under local conditions.	Partnership verification that plantlets and material received.	
Introduce and multiply new germplasm sources with high ß-carotene roots from Latin America, or landraces from national programs in Africa, for subsequent introgression and genetic improvement for high root ß-carotene content.	*Yr 3-4:* New genetic variation for high ß-carotene content evaluated and hybridized.	New Latin American germplasm with high root ß-carotene content available at IITA for breeding. NARES provide IITA African-landraces with ß-carotene containing roots for breeding.	Legal authorities in Brazil authorize the shipment of the germplasm the cassava breeder has offered to share with collaborating institutions.
Retention and Consumer Acceptability See log frame for Food Science and Human Nutrition.			
Bioavailability See log frame for Food Science and Human			

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumptions
Nutrition.			
7. Reaching and Engaging End-Users Specific proposal for cassava under development. See log frame for Reaching and Engaging End-Users.			
8. Management and Coordination Provide financial support and technical oversight to Harvest Plus cassava activities in primary target countries (CIAT and IITA).	Annual work plans. Funding for approved activities disbursed. Technical and financial reports pertaining to funded work plans prepared.	Summary technical and financial reports of financial support provided to at least 3 national program partners of HarvestPlus cassava activities.	
Coordinate HarvestPlus' global network of partners' cassava activities (CIAT).	Integrate partner activities in the HarvestPlus cassava program. Crop leader visits principal partners annually.	Annual technical and financial reports for HarvestPlus global network of cassava partners.	
Produce and circulate quarterly newsletter with information useful for cassava research within this initiative (CIAT).	Quarterly Newsletters produced and circulated.	Number circulated.	

Cost: 2004 (Year 1)—$ 445,049 2005 (Year 2)—$ 938,688, 2006 (Year 3)—$1,012,246 2007 (Year 4)—$1,016,496

Collaborators: (AFRICA) Congo: Institut National de la Recherches Agronomiques (INERA); Ghana: Savannah Agricultural Research Institute; Guinea Conakry: Institut de la Recherche Agronomique de Guinee (IRAG); Nigeria: National Root Crops Research Institute.

(ASIA) India: Indian Council for Agricultural Research (ICAR), Agriculture Universities of India—CTCRI; Vietnam: Thai Nguyen University of Agriculture and Forestry

(LATIN AMERICA): Brazil: Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA), Centro Nacional de Pesquisa de Mandioca e Fruticultura Tropical (CNPMF)—Bahia, Tecnologia Agroindustrial de Alimentos (CTAA)—Rio de Janeiro, Universidade de Sao Paulo—Campinas; Haiti: World Vision.

(AUSTRALIA, EUROPE, NORTH AMERICA) United States: USDA-ARS Plant, Soil and Nutrition Laboratory—Cornell University, Michigan State University—Nutrition Research Center.

PROJECT: **CIAT HARVEST PLUS. - IMPACT AND POLICY ANALYSIS**
PROJECT MANAGER(S): **NANCY JOHNSON AND GLENN HYMAN**

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumption
Goal The goal of HarvestPlus is to reduce micronutrient malnutrition among poor populations in Africa, Asia, and Latin America, thereby improving food security and enhancing the quality of life.			
Intermediate Goals To measure the impact of the biofortification strategy for beans and cassava; To help in identifying (i) constraints to adoption by farmers and acceptance by consumers and (ii) nutrient losses in the marketing and processing chain from producer to consumer; To measure and better understand (i) the role of dietary quality in nutrition security and (ii) the factors (e.g. education, income, food prices) that determine food quality in poor households.	Benefit-cost ratios, measures of cost-effectiveness.	Ex ante benefit-cost analysis; Estimation of health production and food demand functions; Efficacy trials involving biofortified foods (see LogFrame for Human Nutrition), in conjunction with ex post household surveys in regions where biofortified crops have been adopted; Monitoring of breeding and dissemination costs.	Successful breeding and dissemination programs (see the six LogFrames for Phase 1 crop activities; the LogFrame for Human Nutrition; the LogFrame for Reaching and Engaging End-Users)
Purposes To ensure continued investments in the development and dissemination of biofortified beans and cassava; To more efficiently target biofortified crops, to speed up their adoption, and to increase the magnitude of their impact on malnourished individuals; To minimize the overall costs of micronutrient interventions to effect a given reduction in micronutrient malnutrition by exploiting complementarities among various interventions (biofortification, supplementation, fortification, improved dietary quality) to reduce micronutrient malnutrition.	HarvestPlus funding levels by year	.HarvestPlus records.	

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumption
Outputs Initial estimates of benefit-cost ratios for cassava in Brazil and for beans in Central America (2005) provided on regions where biofortified crops would have greatest impact as a function of, inter alia, micronutrient deficiency levels, food intakes, and crop production patterns (2004-2005). Initial information provided to breeders, food technologists, and human nutritionists on various aspects of farm production and household behavior/resource allocation that impinge on the potential impact of biofortified beans and cassava (2005). Comparative analysis of the cost-effectiveness of alternative micronutrient interventions (2006). Policy conclusions for investments in reducing micronutrient deficiencies drawn, inter alia, from cross-country comparisons of various aspects of demand for dietary quality and their impacts on health and nutrition outcomes (2007)	Information provided in 2005. Study terminated in 2005. Analysis terminated in 2006 Policy determined by 2007	Project documentation	
Activities in 2004: Compilation of secondary data and existing literature on consumption for cassava in Latin America and beans in Latin America and Africa Ex ante impact analysis Application cost benefit model for vitamin A enhanced cassava in brazil and for iron-and zinc fortified beans in Central America of the models for cassava in Brazil and beans in a Central American country.	Identify and assemble extant data on consumption in as disaggregated manner as possible for key consuming countries. Collection of data, estimation of benefit-cost ratios/cost-effectiveness, using sensitivity analysis where there is missing information.	Data bases and project progress reports Data bases and Project progress reports	Generic benefit-cost models for biofortified crops with added levels of iron, zinc, or vitamin A, patterned after R. Zimmermann and M. Qaim, "Potential Health Benefits of Golden Rice: A Philippine Case Study," Food Policy, 29(2004), 147-168. developed by the micro nutrient modeling team, Expert team of

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumption
			economists and nutritionists assembled, consensus reached on model specification and parameters, model/data requirements transmitted to crop systems leaders.
Design and implementation of qualitative surveys. For cassava, surveys will be done in 2-3 sites in NE Brazil. For beans, surveys will be done in southern Mexico and in Honduras. .	Evaluate and select survey sites in targeted countries; Conduct farmer group (RRA) and key informant surveys in selected sites; Analyze survey results, produce report, and disseminate information. Detailed descriptive information on production and utilization as well as increased understanding of local nutrition and health concerns and perceptions, particularly related to the targeted crop.	Project reports	
Activities in 2005-2007 Undertake household surveys in each of the cropping systems listed above (2005-2006); questionnaire design informed by qualitative surveys; analysis of data completed by the end of 2007: 1. More precise parameters for ex ante assessment 2. Quantitative measures for issues addressed by the qualitative analysis: Factors affecting variety adoption Food processing practices Health and sanitary environment 3. Policy Analysis	Cross-country comparative policy analysis completed: a. Factors affecting food demand and changes in diets of the poor (income, food prices, farm production patterns) b. Intra-household distribution of food Estimate the impacts of food prices, income, education, perceptions on the demand for micronutrients from various food sources. c. Effect of food/nutrients on nutritional status. d. Effects of improved nutrition on health outcomes, productivity Estimate the effects of diet quality/nutrient intakes on micronutrient status and link micronutrient status empirically to functional outcomes. This is important		

Hierarchy of Activities/Objectives	Indicators/Milestones for Achievement	Means of Verification	Important Assumption
	for estimating cost-benefit ratios for biofortified crops and for linking diets to the global burden of disease estimates		
Mapping (2004-2006)			
Linking of geographically-referenced data on: Micronutrient deficiencies Other health and nutrition outcomes Interventions to reduce micronutrient deficiencies Food intakes Crop production patterns Farming eco-systems	Analysis of (i) targeting of biofortified crops and (ii) country strategies for prioritizing and coordinating biofortification, supplementation, commercial fortification, and policies to improve dietary quality.		
Comparative analysis of cost-effectiveness of biofortification, supplementation, commercial fortification and policies to improve dietary quality (2007)	Drawing policy conclusions linking information from the mapping exercise, cross-country analysis of the household surveys, and literature reviews.		

CIAT - DEVELOPMENT CHALLENGE II. OVERCOMING LAND DEGRADATION LOG FRAME (2005-2007)

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumption
Goal To improve economic and ecological productivity of degraded lands	% degraded lands that have been restored in specific countries.	Project documents. National soil quality statistics.	
Purpose To generate technical, institutional, and policy innovations to restore degraded agricultural lands and to enhance the health ecosystems and livehoods of smallholders.	# adoptable and profitable technologies developed by 2010. # government agencies changing operations as a result of our research approach. # policies adopted in selected countries	Documented case studies at farm, national, and regional scales. Published methods of generalizing improved decision-making, using spatial information of land use.	Uncertainty significantly obstructs land use decisions at a range of scales. Spatial variation introduces significant uncertainty to these problems. Relevant spatial information can be generated in a cost-effective manner.
Output 1 To support the livelihoods of people reliant on agriculture by developing profitable, socially-acceptable and resilient agricultural production systems based on Integrated Soil Fertility Management (ISFM).	By 2015, in at least two countries in each of the major tropical regions where TSBF-CIAT works, the number of rural people in extreme poverty reduced by 10%. By 2010, capacity built in at least three partner countries by at least three of the following: - a national level policy or legislative instrument developed by reference to a TSBF output. - all soil-related national institutions linked to TSBF networks with at least 50% of their scientists engaged in TSBF-inspired topics.	Reports of collaborating national and international institutions – in poverty reduction and sustainable development. National agencies surveys, development plans and reports. International agencies mission and goal statements related to TSBF-CIAT annual reports and accounts.	Poverty reduction strategies remain central to human development support and funding. TSBF stakeholders remain engaged with TSBF-CIAT strategic priorities and/or TSBF management continues to adapt and innovate in response to changing priorities.
Output 2 To strengthen local processes of watershed management and sustainable agricultural development in tropical regions based on the experiences of NRM at research watersheds .	# Workshops conducted # Youth groups / projects Level of community participation in watershed management activities	Project documentation and databases	Local partners continue project-related activities. Donors interested in the proposed project objectives and provide support.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumption
Output 3 Indicators of vulnerability and degradation risks of land use systems determined from analysis of land use in tropical developing countries	Indicators of vulnerability adopted by policy agencies. Spatial information on vulnerability used to reduce investment risks in at least one country case study. Practical risk management tools produced. → Management decisions in case study catchments guided by the outputs of this research.	Methods of vulnerability assessment published with case study at national or regional scale by June 2004. *Ex ante* analysis of the benefits of risk reduction published. Risk management tools adopted by users.	Sufficient data are available to generate insights.
Output 4 Information provided at local and farm-scale that supports individual land management decisions	Strengths and weaknesses, overlaps and gaps identified between farmer and scientist knowledge with respect to locally (e.g., declining soil fertility) and globally rooted resource-base management problems (e.g., climate change). Farmer-to-farmer decision-support network established. → On farm land management changed on the bases of this research's outputs.	Case study documented of farmers generating information and merging with "hard" data on natural land resources. Network of farmer support initiated, including a minimum of 200 users at second-order organization level. Generated methods and tools documented and disseminated.	Sufficient data are available to generate insights. Local structures enable network establishment.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumption
Output 5 Crop and forage grass and forage legume genotypes with superior adaptation to edaphic and climatic constraints are developed.	• Two improved accessions of Vigna and one of Lablab multiplied (500 or 100 kg of seed produced, respectively) and distributed to two national partners (DICTA, INTA), one NGO (SERTEDESO), one farmer organization (Campos Verdes) one development project (GTZ), in Honduras and Nicaragua by 2005 • A new *Brachiaria* hybrid (CIAT 36087, cv. Mulato-II) with better adaptation to acid soils and tolerance to dry season (50% higher dry season forage yield on acid soils than the current hybrid cultivar), and resistance/tolerance to at least three Colombian species of spittlebugs, and with 2-3 times higher seed yield available for release (50 tons of commercial seed available) by 2006 • Defined the genetic variability for nitrification inhibition in at least 500 *Brachiaria* hybrids by 2007 2005 *Pythium* root rot pathogen in beans Eastern Africa (Kenya, Uganda and Rwanda) characterized and species distribution established. *Pythium* resistance genes characterized in 8 sources of ALS resistance and 4 sources of Pythium resistance.	• Demonstrated differences under field conditions • Scientific publications • Annual Reports • Theses Reports from NARS and regional networks. Annual reports. Publications.	• Effective collaboration with CIAT Projects (SB-1, PE-2, PE-4), AROs, partners, NGOs and farmer groups Continued input of pathologist, entomologist, and virologist. Continued donor support to whitefly IPM project.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumption
	2005 Improved ISFM practices adopted in five countries by 7 % of bean farmers: composting, integration of inorganic and organic amendments, use of different types of green manures, crop residue management, integration of varieties tolerant to low soil fertility conditions in Kenya, DRC, Uganda, Rwanda and Tanzania. 2006 Method to quantify *Pythium* and Fusarium root rot pathogens in soil validated. Ten bean lines tolerant to low nitrogen and low pH developed and made available to NARS in five countries in Africa (Malawi, DR Congo, Rwanda, Tanzania, and Kenya). Ten bean lines tolerant to low nitrogen and phosphorus and acid soil complex available to NARS, farm ers and other partners in Africa (DRC, Kenya, Tanzania, Rwanda, Madagascar, Malawi, and Sudan). Studies of the soil pathogens *Rhizoctonia solani* and *Polymyxa graminis* vector of rice stripe necrotic virus (RSNV).	Trials on experiment stations and on farms. National statistics. Publications.	Continued donor support. Active collaboration with all partners involved, including farmers. Adequate support for socio-economic studies.

PROJECT PE-2: TROPICAL SOIL BIOLOGY FERTILITY INSTITUTE

PROJECT DESCRIPTION

Objectives: To support the livelihoods of people reliant on agriculture by developing profitable, socially acceptable and resilient agricultural production systems based on Integrated Soil Fertility Management (ISFM).
To develop Sustainable Land Management (SLM) in tropical areas through the restoration of degraded lands.
To build the human and social capital of all TSBF-CIAT stakeholders for research and management on the sustainable use of tropical soils.

Outputs:
1. Biophysical and socioeconomic processes understood; principles and concepts developed for protecting and improving the health and fertility of soils.
2. Economically viable and environmentally sound soil, water, and nutrient management practices developed and tested by applying and integrating knowledge of biophysical and socioeconomic processes.
3. Partnerships developed and capacity enhanced for improving the health and fertility of soils of all stakeholders.
4. Improved rural livelihoods through profitable, diverse and intensive agricultural production systems.
5. Sustainable land management for social profitability developed, with special emphasis on reversing land degradation.

Gains: NARES, NGOs, IARCs, ARIs, and private sector working together, in partnership with farmers on ISFM, in key research sites in the hillsides, savannas and forest margins of Africa and Latin America. Soil-quality indicators to monitor and evaluate soil health are published and used by farmers and extension workers. Guidelines are widely disseminated for selecting and managing productive and resource-use-efficient crop, forage and fruit components in land use systems (notably Quesungual/agroforestry, cereal- legumes/livestock and banana and cassava systems). Decision-support systems for identifying profitable options to manage organic and mineral inputs, crop residues, and green manure for sustained agricultural production and for controlling erosion are disseminated and used by farmers, NGO's and NARES. Capacity of NARS for integrated soil fertility and below ground biodiversity (BGBD) management is strengthened through regional (AfNet in Africa; MIS in Central America) and global (BGBD) partnerships. Rural poor farmers benefit from adoption of improved food systems that result in increased agricultural productivity, higher income, and environmental protection.

Milestones:
2005 AfNet, MIS, SARNET and BGBD Networks restructured and strengthened
Decision support tools made available to identify more productive, and profitable and resilient smallholder farm production strategies.

Documentation and analysis of farmers' perceptions, preferences, economics and information flow pathways and use of local knowledge within research to extension linkages.
Role of social differentiation in the creation and maintenance of soil fertility analyzed.

2006 Indicators of soil health and fertility at plot and farm scales identified.
Decision support framework for ISFM developed and made available to stakeholders in at least 2 benchmark countries.
Cereal-legumes and livestock systems, with nutrient use efficiency as entry point, tested and adapted to farmer circumstances.
Quesungual and other related agroforestry systems, with water conservation as entry point, including crop diversification strategies, tested and adapted to farmer circumstances.
Increased farm income and production in at least 10 pilot sites in at least six countries.

2007 Indicators of soil quality used for farmer's decision making in hillsides, forest margins and savanna agroecosystems.
Banana and cassava based systems, with the relation between pest, diseases and ISFM as entry point, tested and adapted to farmer circumstances.
Identification, characterization, restoration and monitoring of degraded lands available for at least two countries.
Decision-making tools available for managing soil fertility and productivity on smallholder farms.
Farmers adopting improved system components, including crops and soil management technologies. Strategies developed for demonstrating improved BGBD management and for establishing farmer experimentation.
Economic evaluation/valorization of ecosystem services for trade-off analysis and policy recommendations quantified for the different farming systems and land use.

Users: Principally small-scale crop-livestock farmers and extension workers, NGO's and NARES in tropical agroecosystems of sub-Saharan Africa, Latin America and South-east Asia.

Collaborators: ***NARS:*** KARI (Kenya), NARO (Uganda), ITRA (Togo), INRAB (Benin), SRI (Ghana), IER (Mali), IAR (Nigeria), INRAN (Niger), INERA (Burkina Faso); CORPOICA (Colombia), EMBRAPA (Brazil), INTA (Nicaragua), DICTA (Honduras); ***ARIs:*** CIMMYT, ILRI, CIP, IFDC, ICRAF, IITA, ICRISAT, IRD (France), ETHZ (Switzerland), JIRCAS (Japan); ***Universities:*** Nacional (Colombia), UNA (Nicaragua), UNA and EAP Zamorano (Honduras), Uberlandia (Brasil), Nairobi (Kenya), Kenyatta (Kenya), Makerere (Uganda), Zimbabwe (Zimbabwe), Sokoine (Tanzania), Universidade Federal de Lavras (Brazil) Jawaharlal Nehru University (India), Universitas Lampung (Indonesia) Université de Cocody (Cote d' Ivoire), Instituto de Ecologia (Mexico), Leuven (Belgium), Paris (France), Bayreuth and Hohenheim (Germany), SLU

(Sweden), NAU (Norway), Cornell (USA), Wisconsin-Madison (USA), Ohio State (USA), and Wageningen University and Research Centre (Netherlands). **Regional Consortia:** AFNET, MIS, CONDESAN

CGIAR system linkages: Enhancement & Breeding (10%); Crop Production Systems (30%); Protecting the Environment (30%); Saving Biodiversity (10%); Strengthening NARS (20%). Contributes to SSA and Water and Food challenge programs, the Ecoregional Program for Tropical Latin America, the African Highlands Initiative, and the Alternatives to Slash and Burn Systemwide Program.

CIAT project linkages: Multiple stress adapted and improved crop and forage germplasm (IP-1 to IP-6), integrated soil fertility and soil pest and disease management (IP-1, PE-1), local knowledge about soil management and indicators of soil quality at the landscape scale (PE-4), integrated approaches to study multipurpose legumes for soil fertility management and animal nutrition (IP-5), strategies for sustainable land management (PE-3, PE-4), agroenterprise alternatives to improve profitability of soil management options (SN-1), and strengthening NARS and communities via participation (SN-3, Rural Innovation Institute).

CIAT: PE-2 PROJECT LOGFRAME (2005-2007)

PROJECT: TROPICAL SOIL BIOLOGY FERTILITY INSTITUTE
PROJECT MANAGER: NTERANYA SANGINGA

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goals To strengthen national and international capacity to manage tropical ecosystems sustainably for human well-being, with a particular focus on soil, biodiversity and primary production. To reduce hunger and poverty in the tropics through scientific research leading to new technology and knowledge. To ensure environmental sustainability through research on the biology and fertility of tropical soils, targeted interventions, building scientific capability and contributions to policy.	The principles of sustainable development integrated in country policies and programs. Reversal of the losses of environmental resources, especially loss of soil and belowground biodiversity. Capacity built in tropical countries for sustainable management of natural resources. Developmental and environmental objectives taken inter-dependently.	National plans, human development and environment reports. Data from international organisations (UNEP, FAO, CG-institutes) that monitor the state of environmental resources. Impact studies, IARC and NARS reports, papers and publications.	
Purpose To support the livelihoods of people reliant on agriculture by developing profitable, socially-acceptable and resilient agricultural production systems based on Integrated Soil Fertility Management (ISFM).	By 2015, in at least two countries in each of the major tropical regions where TSBF-CIAT works, the number of rural people in extreme poverty reduced by 10%. By 2010, capacity built in at least three partner countries by at least three of the following: - a national level policy or legislative instrument developed by reference to a TSBF output. - all soil-related national institutions linked to TSBF networks with at least 50% of their scientists engaged in TSBF-inspired topics.	Reports of collaborating national and international institutions – in poverty reduction and sustainable development. National agencies surveys, development plans and reports. International agencies mission and goal statements related to TSBF-CIAT annual reports and accounts.	Poverty reduction strategies remain central to human development support and funding. TSBF stakeholders remain engaged with TSBF-CIAT strategic priorities and/or TSBF management continues to adapt and innovate in response to changing priorities.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
To develop Sustainable Land Management (SLM) in tropical areas through reversing land degradation; To build the human and social capital of all TSBF-CIAT stakeholders for research and management on the sustainable use of tropical soils.	- extension agencies and/or NGOs take up TSBF outputs to apply in their work programs. - farmers' organisations and/or civil society apply TSBF outputs in their plans and work. By 2008, TSBF-CIAT scientists are leading globally funded research on at least three topics of key relevance to the international community (as identified in GEF, MDG, MEA, CGIAR mission and goal statements).		Sufficient funding for research on globally-important issues continues.
Output 1 Biophysical and socioeconomic processes understood, principles and concepts developed for protecting and improving the health and fertility of soils.	By 2006, indicators of soil health and fertility at plot, farm and landscape scales identified. By 2008, practical methods for rapid assessment and monitoring of soil resource base status developed. By 2010, decision tools for soil biota, nutrient and water management developed and disseminated to stakeholders.	Annual Reports/ publications. Reviews published. Documents of synthesized results. Detailed tables published in Annual Report. Decision guides for ISFM developed.	Sufficient operational funds for soil and plant analyses. Literature on constraints available. Farmers continue to participate. Projects SN-1, PE-3 and PE-4, (SN-3), RII and NARS, actively participate.
Output 2 Economically viable and environmentally sound soil, water, and nutrient management practices developed and tested by applying and integrating knowledge of biophysical and socioeconomic processes.	By 2006, decision support framework for ISFM developed, tested with and made available to stakeholders in at least two benchmark countries. By 2008, communities in at least three countries demonstrate and test direct or indirect management options that enhance locally important ecosystem services using BGBD. By 2010, local baselines and interviews show that farmers' understanding of soil processes is demonstrably enhanced within community-based experimentation in at least five benchmark sites.	Annual Reports/ publications. Scientific publications. Soil and crop management guidelines published. Decision support systems developed. Annual reports.	Sufficient operational funds for soil and plant analyses. Literature on constraints available. Farmers continue to participate. Projects SN-1, PE-3 and PE-4, (SN-3), RII and NARS, actively participate.
Output 3 Partnerships developed and capacity enhanced for improving the health and fertility of soils of all stakeholders.	By 2005, AfNet, MIS, SARNET and BGBD Networks restructured and strengthened. Publications (i.e., journal papers, books, extension materials, policy briefs, etc.), workshops, documentaries, field days implemented by each project. By 2010, tools for dissemination of research knowledge	Annual Reports/ publications. Scientific information (theses, publications, workshop reports, project documents) disseminated to network members and all stakeholders.	Continued interest/participation of NARS and ARO partners, and national and international universities. Continued support for

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	developed by each project. By 2010, appropriate policies and innovative institutional mechanisms developed and promoted.	Network trials planned and implemented with partners. Degree-oriented and on-the-job personnel trained (Farmers, NARS, NGO's).	collaborative activities e.g. Challenge Programs.
Output 4 Improved rural livelihoods through profitable, diverse and intensive agricultural production systems.	By 2006, cereal-legumes and livestock systems, with nutrient use efficiency as an entry point, tested and adapted to farmer circumstances. By 2006, Quesungual and other related agroforestry systems, with water conservation as entry point, including crop diversification strategies, tested and adapted to farmer circumstances. By 2006 increase farm income and production in at least 20 pilot sites in at least 6 countries. By 2007, banana and cassava based systems, with the relation between pest, diseases and ISFM as entry point, including novel cropping sequences, tested and adapted to farmer circumstances. By 2008 improved production systems have triple benefits of food security, income and environmental services. By 2008, farmers are testing and adapting improved production systems in at least 15 sites in 5 countries. By 2010, validated intensive and profitable systems are being demonstrated, promoted by partners and adopted by farmers in 10 countries.	Annual Reports/ publications. Farmer's surveys. Regional/national production statistics. Land use surveys (satellite imagery, rapid rural appraisal).	Land survey data available. Farmers adopt new technologies. Socioeconomic conditions are favorable for achieving impact. Adequate resources available for soils research.
Output 5 Sustainable land management for social profitability developed, with special emphasis on reversing land degradation.	By 2007, identification, characterization, restoration and monitoring of degraded lands available for at least 2 regions. By 2008 methods for socioeconomic evaluation/valuation of ecosystem services for trade-off and policy analysis used, at least in 2 humid and 2 sub-humid Agro-ecological zones. By 2010, 30% of partner farmers in pilot sites used SLM options that arrest resource degradation and for increased productivity in comparison with non-treated farms.	Annual Reports/ publications. Farmers surveys. Regional/national production statistics. Land use surveys (satellite imagery, rapid rural appraisal).	Land survey data available to project. Farmers adopt the new technologies. Socioeconomic conditions are favorable for achieving impact. Adequate resources available for land management research.

PROJECT PE-3: COMMUNITIES AND WATERSHEDS

PROJECT DESCRIPTION

Goal: To improve water, food and environmental quality and services through research on land-water-community interactions.

Outputs:

1. Improved watershed management: land-water interactions.
2. More equitable highland-lowland resource (water) allocation.
3. Provision of environmental services: water.
4. Strengthened organizations: community and institutional capacity building.
5. Efficient use of project resources through participatory project management.

Gains: Farmers and local organizations adopt technologies, tools and methods developed by PE-3 and its partners within research watersheds. Results are sustainable, land use improved and natural resources conserved at the watershed level. Partner organizations apply technologies, tools and methods developed in conjunction with PE-3 for their planning and activities at local and regional levels. Decision makers at municipal and regional levels have information, tools and methods provided by PE-3 to support their planning, monitoring and decisions.

Milestones:

2005 *Pilot watersheds*: Monitoring networks / baseline surveys

- A minimum of two water-monitoring networks established within PE-3 watersheds by 2005.
- Links to a minimum of two regional / national monitoring networks by 2005 for data interchange.
- A minimum of two baseline household level water and resource use surveys designed, implemented within PE-3 watersheds and analyzed by the end of 2005.

Integrated watershed management

- Image analysis of land use and management (high resolution imagery and ground truthing) completed within two PE-3 watersheds in 2005.
- Water availability / wetlands hydrologic response research established in one PE-3 watershed.
- Riparian use and management studies initiated in two PE-3 watersheds in 2005.
- Best Management Practices (BMP) assessment in a minimum of two PE-3 watersheds.

Workshops / trainings (Formal): Watershed Management

- One Environmental Sensitive Area workshop completed by 2005 to support joint CIAT / GO hotspot analysis

Youth research / leadership

- A minimum two youth leadership workshops conducted in 2005

- At least a joint UBC youth workshop conducted in 2005

Students / interns

- Two M.Sc thesis to be completed in 2005
- A minimum of one ongoing student research activities supported in 2005
- A minimum of one internship project completed in 2005

Publications / communication: IT

- Website re-design and update completed in 2005
- One CD-ROM highlighting project initiatives completed in 2005
- One ESA method CD-ROM completed by 2005

Guides / brochures

- A minimum two guides produced on youth research for use by schools and communities by the end of 2005

Articles, books, conferences

- A minimum of two scientific papers written and/or presented

Fund raising: Special projects

- Minimum of three special project proposals written and submitted
- Specific donor targets: Kellogg for Colombia and CIDA for Honduras and Nicaragua

2006 *Pilot watersheds:* Monitoring networks / baseline surveys

- Continuation of water quantity and quality monitoring within two PE-3 watersheds
- Expansion of monitoring sites within one PE-3 watershed
- Baseline surveys designed, implemented and analyzed in one additional PE-3 watershed (based on successful fund raising)

Integrated watershed management

- Image analysis of land use / management completed in 2006 for one additional watershed
- Continuation of water availability / hydrologic response research initiated in 2004/05
- Assessment of water efficient technologies monitored in 2005 in two PE-3 watersheds

Workshops / trainings: Youth research

- At least one youth research workshop conducted in 2006
- At least one joint UBC workshop conducted in 2006

Students / interns

- A minimum of one student with research activities ongoing in 2006
- A minimum of one intern for South and Central America respectively

Publications / communication: IT

- Translation of one UBC CD-ROM text into Spanish completed in 2006
- Application of ESA CD translated in 2005

Guides / brochures
- Application of guides produced in 2005 on youth research within two PE-3 watersheds

Articles, books, conferences
- A minimum of two scientific papers written and/or presented in 2006

Fund raising: Special projects
- Minimum of two special project proposals written and submitted in 2006

2007 *Pilot watersheds:* Monitoring networks / baseline surveys
- Continuation of water quantity and quality monitoring within three PE-3 watersheds
- Expansion of monitoring sites within two partner watersheds in South America (based on successful fund raising)
- Baseline surveys designed, implemented and analyzed in two partner watersheds in South America (based on successful fund raising)

Integrated watershed management
- Water balance / availability assessment completed in 2007 for one PE-3 watershed
- Environmentally Sensitive Area Assessment pilot project initiated to adapt the UBC methodology to Latin America (based on successful fund raising)

Workshops / trainings: Youth research
- At least one joint UBC workshop conducted in 2007

Students / interns
- One UBC PhD student thesis completed in 2007
- At least one intern each for South and Central America

Publications / communication: IT
- Website and CD-ROM developed in 2007 highlighting research results in one PE-3 watershed

Articles, books, conferences
- A minimum of two scientific papers written and/or presented in 2006

Fund raising: Special projects
- Minimum of two special project proposals written and submitted in 2007

Users:

Primary clients:	local governments, local organizations, farmer groups, water user associations
Secondary clients:	research institutions, national governments, NGOs
Final beneficiaries:	farmers and communities

Principle Collaborators:
CGIAR: IWMI, Water and Food CP
Universities: CATIE (Costa Rica), UBC (Canada), National Agraria (Nicaragua)

NGO: CGIAB (Bolivia), Randi Randi (Ecuador), ASOBOLO (Colombia), Clodest (Honduras), FIPAH (Honduras), CARE (Nicaragua)
GO: CRQ, CVC (Colombia), INTA (Nicaragua), Municipalities of El Dovio (Colombia) and San Dionisio (Nicaragua), RENOC (Nicaragua)
Local associations: Herederos del Planeta (El Dovio, Colombia), Asociacion Campos Verdes (San Dionisio, Nicaragua)
Regional associations: CONDESAN
CIAT: Soils (PE-2), Land Use (PE-4), Forages (IP-5)

CIAT: PE-3 PROJECT LOGFRAME (2005-2007)

PROJECT: COMMUNITIES AND WATERSHEDS
PROJECT MANAGER: JOSÉ IGNACIO SANZ

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal: To improve water, food and environmental quality and services through research on land-water-community interactions.	Water quantity and quality parameters Water efficiency (use and technologies) Farmer adoption of technologies / methods	Local research / monitoring networks Utility companies Water Associations	
Project Purpose: To strengthen local processes of watershed management and sustainable agricultural development in tropical regions based on the experiences of NRM at research watersheds .	# Workshops conducted # Youth groups / projects Level of community participation in watershed management activities	Project documentation and databases	Local partners continue project-related activities. Donors interested in the proposed project objectives and provide support.
Output 1 Improved watershed management based on knowledge of land-water interactions.	Land-water interactions: Water quantity and quality parameters Land use: % change in use and in management	Field research. data Monitoring networks Primary data collection Image analysis and field verification	Climate variability is normal. Social stability.
Output 2 More equitable highland-lowland resource (water) allocation.	Highland-lowland interactions: Water quality parameters Water quantity (drinking and irrigation) Water use (by sector)	Field research. Monitoring networks Primary data collection Water use survey	Climate variability is normal. Social stability.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
OUTPUT 3 Provision of environmental services: water.	Water: % Homes with service Water quality parameters Water quantity parameters Water use by sector Riparian buffers (type and quality)	Utilities companies records Monitoring networks Primary data collection Water use records Riparian buffer inventory	Climate variability is normal. Social stability.
Output 4 Strengthened organizations: community and institutional capacity building.	# and type of workshops conducted # youth groups / projects # reports, CDs, website links, papers, presentations # and type of partners (GO, NGO, local, regional # Training programs # Youth groups and activities Information dissemination (formats and periodicity) # Partnerships	Primary data collection	Social stability.
Output 5 Efficient use of project resources through participatory project management.	# new projects funded # and type partners and level of participation # data sharing agreements # papers, brochures, website links, CD-ROMS # and type of partners (GO, NGO, local, regional) Approved projects designed with partners and donors # projects adopt methods, techniques, and experiences generated by the project and its partners # Alliances – strategic and special projects	Project database Documentation on replication of methods and techniques Data sharing agreements	Institutional linkages maintained. Adequate donor support obtained.

PROJECT PE-4: LAND USE IN LATIN AMERICA

PROJECT DESCRIPTION

Objective: The land use project provides high quality spatial information that is the basis for better decisions about agricultural land use change. Information at national or global scale is necessary for research to achieve significant impact. Sound decisions for change are essential to reverse the downward spiral of poverty, and are made at a local scale by individual farmers, at regional scale by national ministries, or at global scale by intergovernmental institutions. The definition of a 'better' decision is one that improves the well being of stakeholders through the effective management of agricultural land resources. Such decisions are evident in individual or collective action, policies and investments.

Outputs:

1. Baseline and time-series data. These provide 'feed' material for subsequent analysis, methodology development and tool development.
2. Insight of biological limitations and drivers of land use change developed from spatial analysis of agrobiodiversity.
3. Indicators of risk, resilience and vulnerability of tropical agricultural systems to external and internal stresses, determined from analysis of land use dynamics.
4. Local information and information management systems that support specific individual and collective land management decisions.

These outputs are in line with CIAT's pillars: agro-biodiversity, land degradation and learning to innovate.

Milestones:

2005 High-resolution (90m) digital terrain models processed from SRTM for tropical areas of LAC, Africa and SE Asia, and available to collaborators (June 2005).
Databases of political divisions, crop types, population compiled/updated for 27 countries in LA (Dec 2005).
Canasta software for out scaling forage adoption in LAC available (June 2005).
Homolog method developed for out-scaling of tropical fruits. Tested with collaborators in LAC, SE Asia (Dec 2005).
Method of modelling continental-scale gene flow demonstrated with *Araucaria* sp. and published (Dec 2005).
Impact analysis for Harvest+ CP submitted (Dec 2005).
GEF Proposal on high resolution, national scale indicators of land degradation developed (June 2005).
Research agenda on analysis of collective water use developed for CIAT (Dec 2005).
Coordination of WFCP Theme 2 activities, including management of Phase 2 competitive bids (Dec 2005).
Low-cost participatory methods developed to capture farm-scale information of land productivity (June 2005).

Concept of site-specific development developed and clarified through reports, publications and conferences (Dec. 2005). 60 farming families in case studies benefit directly.
Concept of weather insurance developed and included in proposal (Dec 2005).

2006 1 km climate database generated for pan tropical region (June 2006).
Selected crop specie databases compiled for agro-biodiversity and crop diversification research (December 2006).
Floramap v 1.3 updated to include higher resolution climate database (Dec 2006).
Marksim-DSSAT coupled method for scenario analysis (Dec 2006).
GEF phase I project initiated with collaborators in 6 countries (June 2006).
Hydrologic models applied by CONDESAN to solve problems of environmental servicing and land degradation in 3 trial catchments in LAC (Dec 2006).
Coordination of WFCP Theme 2 activities (Dec 2006).
Methods of analyzing farm product quality in relation to management * environment * genotype developed and validated for coffee (June 2006).
Methods to analyze joint biophysical and social networks developed (Dec 2006).
Site-specific production opportunities for non-commodity crops demonstrated with farmer groups in LAC (Dec 2006). 3000 farmers benefit directly.

2007 High resolution, dynamic vegetation change database compiled from satellite imagery for pan tropical region (Dec 2007).
GxEngine prototype tested (Dec 2007).
Indicator maps of vulnerability to natural hazards produced at regional, national and sub-national scale in 6 countries as part of GEF Ph I (Dec 2007).
Vulnerability framework developed for policy-makers and included in WB methodology (Dec 2007).
Coordination of WFCP Theme 2 activities (Dec 2007).
Methods and software to target environmental niches in hillsides made available and up scaled to 100 producer networks (Dec 2007).
Natural hazard insurance implemented through 3-5 NGO groups in LA and Africa (Dec 2007).

Collaborators: Water for Food Challenge Program, ICRAF, CIP, ILRI, ECLAC, WWF-US, Univ. Guelph (Canada), IICA (Costa Rica), IILA (Italy), IIASA (Austria), WRI (USA), RIVM (Netherlands), TCA (Amazonian Cooperation Treaty), Earth Council (Costa Rica), World Bank; NARS, GOs, and NGOs in Latin America: DNP, IGAC, MinAmbiente, IDEAM, CARDER (Colombia); Ministry of the Environment, EMBRAPA (Brazil); IVITA, INIAA (Peru); INIAP (Ecuador), Cenicafe, Cenibanano, GTZ.

CGIAR system linkages: Protecting the Environment (60%); Improving Policies (20%); Enhancement & Breeding (10%); Saving Biodiversity (10%). Contributes to the Ecoregional Program for Tropical Latin America.

CIAT project linkages: GIS studies assist SB-1, SB-2, IP-1, IP-3, IP-5, IP-6 and PE-2; model development with PE-3, PE-6, and BP-1.

CIAT: PE-4 PROJECT LOG FRAME (2005-2007)

PROJECT: LAND USE IN LATIN AMERICA
PROJECT MANAGER: SIMON COOK

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To support agricultural development by providing spatial information that is *novel, significant* and *actionable* and thereby reduces the risk to agricultural development in the tropics.	Risk recognized as a reducible factor. Information adopted by decision makers. CIAT, CGIAR, or other collaborating research institutional activities enhanced by the ability to target activities.	Policy, projects, or funding strategies modified identifiably to include spatial information. Research portfolios modified identifiably by targeting or pre-selection. Risk management strategies, based on spatial information, included in development projects.	
Purpose Our goal is to provide spatial information that enables better decisions about agricultural land use change. Such information is derived from analyses at the local, regional and global scale and provided to individual farmers or the associations and organizations that work with and for them.	Decision makers use spatial information to reduce risk.	Documented case studies at farm, national, and regional scales. Published methods of generalizing improved decision making, using spatial information of land use.	That uncertainty significantly obstructs land use decisions at a range of scales. That spatial variation introduces significant uncertainty to these problems. That relevant spatial information can be generated in a cost-effective manner.
Output 1 Baseline and time-series data for subsequent analysis performed.	Population, crop, and selected databases generated. Detailed climate data sets developed for modelers. Detailed future climatic data sets used to predict climate change effects.	Information available at CIAT. Selected information downloadable at CIAT Web site.	Information can be delivered to analysts and decision makers.
Output 2 Insights to biological limitations and drivers of land use change developed from spatial analysis of agrobiodiversity.	Threats of global climate change (GCC) to regional crop production defined for regions. Threats of climate change in specific environments to plant genetic resources defined. Opportunities for improved genetic resource management defined for regions.	Maps and databases completed. Models developed, calibrated, verified, and published. Projects developed to apply models.	Sufficient data are available to generate insights.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	Homologue, FloraMap and MarkSim user community established. Management decisions based on the use of these tools.		
Output 3 Indicators of vulnerability and degradation risks of land use systems determined from analysis of land use in tropical developing countries	Indicators of vulnerability adopted by policy agencies. Spatial information on vulnerability used to reduce investment risks in at least one country case study. Practical risk management tools produced. → Management decisions in case study catchments guided by the outputs of this research.	Methods of vulnerability assessment published with case study at national or regional scale by June 2004. *Ex ante* analysis of the benefits of risk reduction published. Risk management tools adopted by users.	Sufficient data are available to generate insights.
Output 4 Information provided at local and farm-scale that supports individual land management decisions	Strengths and weaknesses, overlaps and gaps identified between farmer and scientist knowledge with respect to locally (e.g., declining soil fertility) and globally rooted resource-base management problems (e.g., climate change). Farmer-to-farmer decision-support network established. → On-farm land management changed on the bases of this research's outputs.	Case study documented of farmers generating information and merging with "hard" data on natural land resources. Network of farmer support initiated, including a minimum of 200 users at second-order organization level. Generated methods and tools documented and disseminated.	Sufficient data are available to generate insights. Local structures enable network establishment.

PROJECT SW-2: SYSTEMWIDE SOIL, WATER, NUTRIENT MANAGEMENT PROGRAM

PROJECT DESCRIPTION

Objective: To contribute to long-term increases in agricultural productivity, poverty reduction, and the conservation and enhancement of land and water resources.

Outputs:
1. Economically viable SWNM technologies that are socially acceptable and ecologically sound.
2. Improved methods and diagnostic tools for PR.
3. Indicators to monitor the environmental and economic impact of land use systems.
4. Decision-support systems, such as models and GIS, for generating and extrapolating options.
5. Stronger institutional capacity to implement SWNM programs and policies.
6. A framework for partnerships between stakeholder groups.
7. Information on appropriate policies to promote sustainable practices.

Gains: Linkages of research on SWNM at key sites within the CGIAR Ecoregional programs. Improved research efficiency through collaboration among NARS, IARCs, and SROs through capacity building. Prevention of duplication of efforts in SWNM and increased rate of technology development. A core group of resource management scientists. Accelerated scientific progress through sharing of experience, common methods, databases, and models across regions. Strengthened research projects already in place through an integrated approach. Complementation of ongoing research where knowledge gaps exist and provision of new knowledge is required to improve NRM worldwide.

Milestones:

2005 Independent community-based investigations established by the four consortia in benchmark areas. Technologies for soil improvement established in two sites.

2006 Capacity of stakeholders to plan and implement research programs on sustainable land management enhanced.

2007 Policies that address equity issues, access to resources, and land tenure developed.

Users: Farmers and other land users, NARS, extension workers, NGOs, and community-based groups.

Collaborators: IARCs (IFDC, ICRISAT, ICARDA, IITA, ICRAF); NARS, universities, and AROs of the four SWNM consortia.

CGIAR system linkages: Crops (9%), Livestock (21%), Protecting the Environment (50%), Policy (10%), Strengthening NARS (10%).

CIAT project linkages: Confronting soil degradation (PE-2); watershed resource management (PE-3); land use studies (PE-4) and participatory methods (SN-3).

CIAT: SW-2 PROJECT LOG FRAME (2005-2007)

PROJECT: SYSTEMWIDE SOIL, WATER NUTRIENT MANAGEMENT PROGRAM
PROJECT MANAGER: NTERANYA SANGINGA

The SWNM program's log frame, presented below, is still being developed, pending contributions from the four research consortia.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute to long-term increases in agricultural productivity, poverty reduction, and the conservation and enhancement of land and water resources.	Agricultural production increased in benchmark sites. Farmers' income increased. Land degradation halted or decreased.	Agricultural census data. Human welfare statistics.	
Purpose To develop, disseminate, and promote implementation by land users of effective, ecologically sound technologies and systems for sustainable land management and conservation.	20% of farmers in restricted areas adopt at least one new SWNM technology per consortium through individual and community-based actions. Information on SWNM technologies published.	Surveys of land use practices. Lists of publications, Web pages. Bulletins and brochures.	Policy environment is favorable for the adoption of improved SWNM technologies. Farmers are reached through NARES and IARCs. NARES have the means to disseminate technologies and information.
Output 1 Technologies and tools for improved soil, water, and nutrient management developed.	At least two new or improved SWNM technologies developed by each of the four research consortia.	Publications in international journals. Manuals and decision-support tools. Annual reports.	External funding levels are maintained. Benchmark sites established and maintained with partners.
Output 2 Community-based institutional mechanisms that encourage use of sustainable land management practices developed, tested, and promoted.	Each consortium has established at least one community-based organization in each restricted area or study site.	Annual reports, newsletters, and bulletins.	Community-based groups continue with their own resources. Institutions within each consortium maintain their matching support for the SWNM program.
Output 3 Capacity of stakeholders to plan and implement research programs on sustainable land management enhanced.	Farmers, NARES personnel, and policy makers trained. At least four training manuals and guidelines for SWNM produced.	Numbers of training courses and field visits held. Number of personnel trained. Institutional reports.	NARES have means to execute programs.
Output 4 Policies that address equity issues, access to resources, and land tenure developed.	Guidelines and decision-support systems developed.	Policy guideline documents. Publications in international journals.	Policy makers are open to dialog with SWNM program.

DEVELOPMENT CHALLENGE III - ENHANCING RURAL INNOVATION: LEARNING TO INNOVATE

PROJECT DESCRIPTION

Objectives: The Rural Innovation Institute improves the capacity to innovate of resource poor, rural producers and businesses by increasing the scale and impact of new methods and approaches developed by the Institute's projects and programs to strengthen competitiveness, client-driven experimentation and knowledge sharing. All the work of the Institute is carried out in its projects which are presented in the Medium Term Plan as separate LogFrames: SN1 Rural Agro-enterprise Development (RAeD); SN3 Participatory Research Methods (IPRA) and SN4 Information for Development (InfoCom). The Institute also hosts the CGIAR Program on Participatory research and Gender Analysis (PRGA). All resources are allocated through the projects.

Outputs:

1. A territorial approach and associated methods and tools for the participatory design and execution of rural agro enterprise development designed, validated and in widespread use. These demonstrably diversify and add value to the production of resource-poor, rural producers and businesses.
2. Participatory research principles, approaches, methods, tools and organizational principles for client-driven experimentation and a learning selection approach to innovation in a resource-to-consumption framework and show how these strengthen the capacity of R&D institutions to support and work with farmer-led research and improve the capacity of farmers to manage risky innovations.
3. Improved approaches, methods and tools using new information and communications technologies (ICTs) developed, validated and in widespread use. These improve the capacity to innovate by obtaining, generating and sharing information and knowledge of resource poor producers, agro enterprises and businesses in rural communities and the R&D organizations serving them.
4. Mainstreaming gender analysis and equitable participatory research to promote learning and change in CG centers and NARS so that they can better target the demands of beneficiary groups, particularly poor rural women.

Gains:

Resource-poor producers and businesses improve capacity to innovate in order to assure food security, link to markets, compete effectively and increase income generation.

Milestones:

2005 At least three Innovation Case studies document and analyze significant processes of improving capacity to innovate.
At least one novel RII projects' approach or methodology devised originally in Latin America adapted to Southeast Asia and/or East Africa and used on a significant scale with a national partner.
Up to four impact studies of participatory research completed and available through the RII-related websites.

Mainstreaming gender analysis and equitable participatory research to promote learning and change in CG centers and NARS so that they can better target the demands of beneficiary groups, particularly poor rural women.

2006 At least two examples of large scale Rural Innovation Learning Alliances are providing working models of approaches and impacts.
National and local training programs have been implemented in at least four countries in Latin America, Asia and/or East Africa.
At least two Impact studies and/or results from participatory monitoring and evaluation systems document the effect of RII projects' approaches, methods, tools or organizational principles on the diversity and rate of innovation in the beneficiary groups and on capacity to undertake risky innovation.
Gender mainstreaming implemented in at least one system wide partnership with national programs in Asia.

2007 Assessing results to date of mainstreaming of participatory research methods and gender At least six Innovation Case Studies document and analyse significant processes of improving capacity to innovate.
The first stage of a cumulative meta-analysis of innovation case studies investigating the effect of capacity to innovate on food security and income generation is available.
At least two novel RII projects' approach or methodology devised originally in Latin America adapted to conditions in Southeast Asia and/or Eastern Africa and used on a significant scale with up to three national or international partners.
A major report disseminated analysis for use in agriculture and natural resource management in the CGIAR system.

Users: The Institute works primarily on behalf of small-scale farm producers and agro-enterprises together with the businesses and agencies that serve them, including private, public and not-for-profit organizations, community-based organizations and farmer organizations. Among the rural poor, women and ethnic minorities and their organizations are especially important as beneficiaries.

Collaborators: CIRAD, NRI, PRODAR (in Lima), IDRC, CIP, IITA, SEARCA, UPWARD, CARE, CRS, Foodnet. CIPASLA (Colombia), CLODEST (Honduras), Africare (Uganda), TIP (Tanzania), ADD-Lilongwe (Malawi). ODAR-IICA (Peru), members of P*h*Action (GTZ, NRI, JIRCAS, ACIAR, CIRAD, FAO, IITA, CIP, IFPRI, IRRI); ASARECA (Foodnet), the W.K. Kellogg Foundation Latin America Program. NARIs, NGOs and Community-Based Organizations in Brazil, Peru, Colombia, Ecuador, Bolivia, Honduras, Nicaragua, El Salvador, Kenya, Uganda, Uganda, Ethiopia, Sierra Leone. Various international organizations that support the use of ICTs for development, including Fundación Chasquinet (a Latin American initiative based in Ecuador), the Global Knowledge Partnership (GKP), and the global Association for Progressive Communication (APC). In addition to gaining from these organizations' experience and expertise, CIAT can tap into their networks of local partners in developing countries. In its work on e-learning, the project works through REDCAPA (Red de Instituciones

Vinculadas a la Capacitación en Economía y Políticas Agrícolas en América Latina y el Caribe (REDCAPA), based in Brazil, and through national partners, such as Colombia's National University. Cgiar centers, NARIs and NGOs participating in the PRGA program's international working groups on Participatory Plant Breeding (PPB), Natural Resource Management (NRM) and Gender Analysis.

CGIAR system linkages:
Enhancement and breeding: 35%
Crop production systems: 20%
Information: 25%
Livestock 10%
Training: 10%

CIAT – DEVELOPMENT CHALLENGE III. RURAL INNOVATION INSTITUTE: LEARNING TO INNOVATE LOG FRAME (2005-2007)

RII DIRECTOR: JACQUELINE ASHBY

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal Contribute to improving capacity for continuous innovation that increases the food security and income of resource-poor, rural producers and agro-enterprises.	- By the end of 2010 active RII stakeholders and their partners, especially resource-poor producers and their organizations, and in particular women and ethnic in projects areas are using the approaches, methods, tools and organizational principles originating from the Institute's research as instrumental in improving their innovativeness, food security, competitiveness and income.	- Beneficiary assessments - Participatory monitoring and evaluation reports from RII projects	
Purpose To increase the scale and impact of methods and approaches for improving capacity to innovate in resource-poor, rural producers and agro-enterprises and in the businesses and agencies that serve them.	- By the end of 2007 at least six Innovation Case Studies document and analyze significant processes of improving capacity to innovate. At least two novel RII projects' approach or methodology devised originally in Latin America adapted to Southeast Asia and/or East Africa and used on a significant scale with a national or international partner. - The first stage of a cumulative meta-analysis of innovation case studies investigating the effect of capacity to innovate on food security and income generation is available in 2007 - At least three examples of large scale Rural Innovation Learning	- Innovation Case Study reports - A refereed journal article on meta-analysis of innovation cases - Learning Alliance reports - Project reports to donors and partners	- Globalization does not impede the resource poor from improving their competitiveness by building a capacity for continuous innovation - CIAT projects and scientists adopt rural innovation as a goal and collaborate in rural innovation approaches center-wide - Partner institutions have the resources, political will and policy leverage to leverage an enabling environment for innovation by resource-poor producers

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	Alliances are providing working models of approaches and impacts by 2007		
Outputs 1. SN1: A territorial approach and associated methods and tools for the participatory design and execution of decentralized rural agro enterprise development schemes developed, validated and in widespread use that are demonstrably diversifying and adding value to the production of resource-poor, rural producers and businesses.	1. SN1. By the end of 2007, the project has activities in up to three reference sites complemented by at least one agro-enterprise Learning Alliance with important partner institutions in LA who are widely using the methods, tools, and institutional models developed by the project. At least one of the projects' approaches, methods or tools has been adapted by one partner in South or Southeast Asia and/or Africa and is being applied in up to three sites through an expanded or new agro-enterprise Learning Alliance.	- Reports and other documents of the L earning Alliance or other partner institutions. - Manuals - Project annual reports and proposals. - Project home page. - Training materials and reports.	- Political and institutional support for sustainable rural and agricultural development at the reference sites and targeted countries is maintained. - Natural disasters or civil strife do not impede progress toward the goal
2. SN3: Participatory research principles, approaches, methods, tools and organizational principles for client-driven experimentation and a learning selection approach to innovation in a resource-to-consumption framework and show how these strengthen the capacity of R&D institutions to support and work with farmer-led research and improve the capacity of farmers to manage risky innovations.	2. By the end of 2007 lessons have been documented from testing and validating the resource to consumption framework at least two countries. National and local training programs have been implemented in at least four countries in Latin America, Asia and/or East Africa, Impact studies and/or results from participatory monitoring and evaluation systems document the effect of the project's participatory approaches, methods, tools or organizational principles on the diversity and rate of farmer-led innovation in the beneficiary groups and on their capacity to undertake risky innovation. The	- SN4 Project Annual and donor Reports, proposals Website - Partners publications and reports and proposals CIAL database	- Institutions committed to the principles of PR - Stable institutional leadership - Committed communities - Favorable environmental and agrarian policies - Absence of social conflict at the reference sites - Data available from the reference sites - Availability of information from partners

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	results and lessons are in use in at least one participatory research Learning Alliance.		
3. SN4: Improved approaches, methods and tools using new information and communications technologies (ICTs). developed, validated and in widespread use that improve the capacity of resource poor producers, agro enterprises and businesses in rural communities and the R&D organizations that serve them to innovate by obtaining, generating and sharing information and knowledge.	3. By the end of 2007 improved knowledge-sharing (KS) capability in at least two CGIAR centers and one CG Challenge program and their national partner organizations. Better access to CIAT-related KS methodologies and approaches via training in the use of KS tools and techniques provided to about 15 CGIAR center staff and at least three national partners. A greater capacity in at least 10 local organizations to satisfy demand for knowledge and information in rural communities. At least three cases of effective knowledge sharing in the CGIAR centers documented.	- Impact evaluation within a sustainable livelihoods framework, based on interviews with key informants and group techniques in selected rural communities. - Case studies on learning and change in R&D institutions. - Impact evaluation of e-learning courses, development approaches, and training products developed by CIAT and national partners. - Case studies on the use of information obtained with the aid of ICTs in target rural communities.	- Public and private telecommunications agencies support initiatives to create affordable, reliable Internet access in remote rural areas. - National and local organizations can generate resources through information services that enable them to sustain these services. - National and local organizations gain credibility in rural communities as reliable providers of useful Web-based information services
4. Mainstreaming gender analysis and equitable participatory research to promote learning and change in CG centers and NARS so that they can better target the demands of beneficiary groups, particularly poor rural women.	4. By 2007 at least five case studies and meta-analysis of the impact of participatory research methods in agriculture and NRM is published. The organizational change experience of at least three CGIAR Centers, up to six national programs and one CGIAR Challenge program attempting to improve gender mainstreaming is documented and the lessons widely disseminated in the CGIAR system.	- PRGA Program annual reports - PRGA website - PRGA partner reports - Refereed journal articles - PRGA PPB, NRM and Gender Working Group members testimonies, research proposals, reports and publications	- The PRGA sustains the support of donors, CIAT Board of Trustees and Management in the allocation of resources sufficient to provide it with the convening power and credibility to add value to the work conducted in the CGIAR Centers and Challenge programs.

PROJECT SN-1: RURAL INNOVATIONS INSTITUTE: AGROENTERPRISES DEVELOPMENT

PROJECT DESCRIPTION

Objective: To develop methods and tools for use by local practitioners in the participatory design and execution of development schemes for decentralized, rural agro-enterprise, by which the production of smallholders can be diversified and value-added.

Outputs:

1. Methods for identifying viable market opportunities that would incorporate small-scale farmer selection criteria.
2. Decision-making tools and institutional models for strengthening rural agro-enterprises and complementary support services.
3. Methods and tools for developing local capacity to select and develop postharvest processing and handling technologies.
4. Options for integrating collective action with business organization to establish sustainable enterprises.
5. National personnel trained in the design and execution of agro-enterprise development projects.

Gains: Rural populations in CA, Andean Region, Eastern and Southern Africa, and Southeast Asia gain enhanced capacity to establish small-scale agro-processing enterprises. Linkages improved between conservation, production, added-value processing, markets, and consumers. Sustainable production practices catalyzed and adopted more widely.

Milestones:

2005 Guidelines for identifying and developing viable rural agro-enterprises prepared for Eastern Africa, based on pilot experiences in Uganda, Malawi and Tanzania.
Manuals and reference documents published that provide a training suite related to the development of agro-enterprises within a territorial approach.
Guidelines for evaluating and strengthening rural business development services developed through pilot experience in Honduras and Colombia.
Prototypes of Information System designed to enhance the competitiveness of Rural Enterprise Development and the Rural Agro-industrial Research Groups concept.

2006 Guidelines for identifying and developing viable rural agro-enterprises validated and adapted for SE Asian situations.
Learning Alliance concept extended with CRS to West and Central Africa and S and SE Asia.

2007 Initial products on trade and agribusiness policy issues related to the development of agro-enterprises available.

Model of the Information System for Rural Enterprise Development scaled up in pilot sites in Latin America, E. Africa and SE Asia.
The Rural Agro-industrial Research Groups concept validated in Central America and South America.

Users: Immediate beneficiaries are the technical personnel of GOs and NGOs in rural development and rural policy makers. Ultimate beneficiaries are the inhabitants of rural areas, including female small farmers, and entrepreneurs, who benefit from training and information on market opportunities, postharvest technologies, enterprise skills, and access to better support services.

Collaborators: *Development of methods and technology components:* CIRAD, NRI, PRODAR (in Lima), IDRC, CIP, IITA, SEARCA, UPWARD, CARE, CRS, Foodnet. *Execution of pilot projects:* CIPASLA (Colombia), CLODEST (Honduras), Africare (Uganda), TIP (Tanzania), ADD-Lilongwe (Malawi). *Training and networking:* PRODAR-IICA (Peru), members of P*h*Action (GTZ, NRI, JIRCAS, ACIAR, CIRAD, NZCFR, FAO, IITA, CIP, CIAT, IFPRI, IRRI, MSU, CLAYUCA, World Bank, UNIDO; ASARECA-Foodnet).

CGIAR system linkages: Crops and Livestock Production Systems (15%); Livestock (5%); Protecting the Environment (20%); Training (10%); Information (10%); Networks (10%); Organization and Management (30%). Participates in the Global Post-*h*arvest Forum (P*h*Action).

CIAT: SN-1 PROJECT LOG FRAME (2005-2007)

PROJECT: **RURAL INNOVATIONS INSTITUTE: AGROENTERPRISES DEVELOPMENT**
PROJECT MANAGER: **SHAUN FERRIS**

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To improve the livelihoods of rural populations in LA, Africa, and Asia by enhancing the capacity of support institutions to promote competitive and environmentally responsible agro-enterprises that equitably link smallholders to growth markets.	Percentage decrease in rural poverty index in selected areas of Africa, Asia, and LA.	National statistics of different countries where projects have been implemented.	
Purpose To develop methods and tools for use by local practitioners in the participatory design and execution of decentralized rural agro-enterprise development schemes aimed at diversifying and adding value to the production of smallholders.	By the end of 2007, the project has complemented its activities in the reference sites by establishing alliances with important partner institutions in LA who are widely using the methods, tools, and institutional models developed by the project. These products have been adapted by partners in Asia and Africa and are applied in a selected number of sites on both continents.	Reports and project documents of our partner institutions.	Political and institutional support for sustainable rural and agricultural development at the reference sites and targeted countries is maintained. Natural disasters or civil strife do not impede progress toward the project's goal.
Output 1 Tools, methods, and information for identifying and developing market opportunities, developed as an input for the design of economically viable and sustainable rural agro-enterprises.	2005 An Introductory document / guide to the territorial approach to agro-enterprise development available in English and Spanish. Three introductory guides to marketing and business orientation available in Spanish. Three training manuals for market opportunity identification translated into three languages available and being used by partners in LA, Asia, and Africa. A Manual on market facilitation available in English. 2006 A Training manual for the design of market plans	Manual published. Annual reports and project proposals. Project home page. Training materials.	Collaborating institutions have adequate capacity, knowledge, local management support and resources to use the materials and tools developed. Natural disasters or civil strife do not impede progress toward the project's goal.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	and strategies for small agro-enterprises available in Spanish and English. 2007 Two methods and tools for identifying market opportunities available for use in different situations in Spanish and English; methods developed at the reference sites and elsewhere through alliances.		
Output 2 Tools, methods, and information systems that can be used in the selection, local development and adaptation of appropriate post-harvest technologies for small-scale rural agro-enterprises.	2005 A method developed for establishing a local market information system in support of agro-enterprise development in English for Africa. Two Information systems on alternative trade and cassava based options available in Spanish. 2006 A method developed for establishing a local information system in support of agro-enterprise development in Spanish. A web-based guide developed on techniques for the participatory development of new rural agro-industrial products and processes. 2007 A manual on methods and techniques for the participatory development of post harvest technology for improving the efficiency of rural agro-industry in Spanish.	Project home page. Manuals published. Annual reports and working documents.	Support for capacity building of practitioners on post harvest and value adding technology
Output 3 Information, options, and recommendations for the design of efficient and effective organizational and business schemes for small-scale rural agro-enterprise and their support services.	2005 One case study reporting small rural agro-enterprises, documenting best practices, key success factors, and lessons learned, completed for LA, Africa and Asia. A guide and radio programme for collective marketing available in English. A guide for facilitators and for the organization of enterprises, their links in the agri-food chain available.	Case studies published. Project proposals and annual reports. PhD thesis on agro-enterprise clusters (local food systems). Software available from RAeD website MP3 files available	Pro-active involvement of local practitioners and the private sector

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	2006 One guide for private sector on options for the organization of enterprises, their links in the agri-food chain available. A profitability software application available in two languages English and Spanish. 2007 One evaluation of the organization of enterprises, their links in the agri-food chain and access to support services in the reference sites and with other partner institutions in LA. One prototype GIS decision support software on spatial and marketing opportunities developed		
Output 4 Institutional models and policy options for establishing and strengthening rural agro-enterprises and their support systems within a territorial context.	2005 Nine agro-enterprise projects being executed at reference sites in LA, Asia, and Africa. A guide to evaluating and strengthening RBDS services in support of rural agro-enterprises available in two languages (Spanish and English). 2006 A guide to policy markers in relation to public private sector partnerships developed in Spanish A manual for identifying and developing integrated R&D rural agro-enterprise projects completed in Spanish. 2007 A guide for designing local support systems to promote agro-enterprises at the micro regional level available in two languages (English and Spanish). An evaluation of globalization on trade opportunities for small-scale producers in reference sites.	Project proposals and reports. Published field guides and associated training materials. Guide published.	Pro-active involvement of policy makers

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 5 Alliances consolidated with a range of strategic stakeholders, with whom the project carries out research and training to enhance the capacity to design and develop successful agro-enterprise projects.	2005 Four learning alliances established in reference sites with partners in L-Andean, CA, SEA and East Africa. A Meeting organized to consolidate linkage between major research and development agencies in southern reference site country. 200 personnel trained in aspects of agro-enterprise development in LA, Africa, and Asia. 2006 Three case studies on the adoption and impact of agro-enterprise R&D completed in each continent. A project Web site expanded and updated periodically with project outputs. 2007 One strategic learning alliance with research and development partners for both research and capacity building completed in reference sites in LA, SEA and Africa.	Training documents, course evaluations, and annual reports. PhD thesis completed on rural innovation and impact of the project's work in the LA reference sites. Project's Web site. Letters of Understanding, project contracts, and inter institutional agreements. PhAction partnership see website	Continuous (sustainable) Participation of relevant stakeholders Maintained management support from lead partner organizations, process not affected by staff turnover

PROJECT SN-3: RURAL INNOVATIONS INSTITUTE: PARTICIPATORY RESEARCH

PROJECT DESCRIPTION

Objective:
To develop and disseminate participatory research (PR) principles, approaches, analytical tools, indigenous knowledge, and organizational principles that strengthen the capacity of R&D institutions responding to the demands of stakeholder groups for improved levels of human well-being and agroecosystem health.

Outputs:
1. PR approaches, analytical tools, and indigenous knowledge that lead to the incorporation of farmers and other users' priorities in R&D agendas developed for interested institutions.
2. Organizational strategies and procedures for PR including fostering Institutional Learning and Change (ILAC) to support PR.
3. Professionals and others trained as facilitators of PR.
4. Material and information on PR approaches, analytical tools, indigenous knowledge, and organizational principles developed.
5. Impact of SN-3 activities documented.
6. CIAT projects and other institutions supported and strengthened in conducting PR.
7. Capacity of the SN-3 team strengthened.

Gains:
Users involved at early stages in decisions about innovation development. Methods available for incorporating user preferences. Participatory methods applied on a routine basis in CIAT research. At least three LAC universities with the capacity to teach PR methods. At least 1000 trainees and 40 trainers able to apply these methods in the region. Contribution of PR to technology adoption rates measured in restricted areas. Lessons learned, and methodologies and materials disseminated globally, jointly with the Systemwide Programme on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation (SP-PRGA), convened by CIAT, and with the Farmer Participatory Research for the IPM project of the Systemwide Program on Integrated Pest Management (SP-IPM).

Milestones:
2005 Capacity of national partners to implement and support PR and PM&E processes established within R&D institutions in at least two countries in Latin America (Bolivia, Colombia, Honduras and Nicaragua incorporated to this milestone) and at least three countries in East and southern Africa (Uganda, Tanzania and Malawi).

A national team of university-certified trainers, linked to the Bolivian Agricultural Technology Development (SIBTA) system, trained in Bolivia, to scale up PM&E methodologies.

A complete set of Training Materials made available to Latin American users to expand the application of PM&E methods.

A publication summarizing ten case studies on the application of PM&E methods in Bolivia, released.

At least five second-floor on-farm PR organizations established to provide support to first-level CIALs groups, generating technologies and linking with governmental organisms established in Honduras, Colombia, Ecuador and Nicaragua.
Agreements for the development of thesis, in two universities in Colombia and Bolivia, to apply PR methods.
Report of impact study of PR interventions in Honduras and Colombia, regarding the establishment of CIALs and their impact on community and agricultural development.
Lessons from at least two innovation histories documented and internalized by the participants in the respective innovation processes.
Lessons from strengthening the capacity of at least 20 rural communities to identify and develop sustainable agro-enterprises that generate income and employment (including consolidation of enterprises developed in initial phase, and establishment of viable supply chains for prioritized products) documented and disseminated.
A set of training guides and field manuals on Enabling Rural Innovation (ERI) processes, PM&E systems, facilitation skills, participatory diagnosis, managing partnerships and group dynamics, published, disseminated and used by partners and research and development organizations in East and southern Africa.
Assess and document links between social capital, gender, NRM and livelihood strategies in selected ERI pilot sites, and publish a journal article on strengthening social capital and farmer research group development processes.
Document baseline situations and livelihood strategies in the second generation pilot sites in Malawi, Tanzania and Uganda.
Three journal articles summarizing experience and results of developing and applying ERI approaches published in peer-reviewed journals.
A journal article on participatory processes for influencing policy change in NRM published
Lessons on second order associations and how they should be structured to provide effective linkages between R&D and communities documented and disseminated to national partners in East Africa.

2006 National team of trainers/facilitators scaling up PM&E and PR processes at national level within the SIBTA system in Bolivia.
Local capacity to identify demands and develop projects that respond to these demands, which feeds into Bolivian national agricultural research and technology transfer system (SIBTA).
Results of impact assessment studies to derive lessons on impacts of PR methods on livelihoods disseminated in Latin American and East-Africa countries.
PM&E systems evaluated and lessons applied to develop guidelines and principles appropriate for Africa.

An approach developed to documenting innovation histories to foster institutional learning and change by stakeholder organizations.
Develop decision support tools to equip farmers and their local service providers for selecting among options for knowledge-intensive technologies.
Develop, implement, and document strategies and approaches that enable women and the poor to benefit from increased household incomes (including market studies that examine role of women traders), participation in ERI and collective action processes in marketing and NRM.
Develop effective linkages with other regional networks (including AfNet, AHI, and PELUM) and increase effectiveness and interactions between CIAT and other Africa-based CGIAR Centers.
Develop and promote effective processes and methods for strengthening the organizational capacity of rural communities for collective action, and the support role played by service providers and local government officials, for improved livelihoods and NRM, empowering rural communities and equitable distribution of benefits for the poor, women, and other local stakeholders.
A publication summarizing case studies of exploring market opportunities for smallholder farmers and linking farmers to markets in ERI pilot sites in eastern and southern Africa, released.
Increase the capacity and skills of farmer research groups and farmers from pilot learning sites to better manage their resource, identify and develop agro-enterprises, better organize their communities and to link-up with rural service providers) to access, evaluate and generate a diverse range of crop, livestock and soil fertility management technologies to address issues linked to market production, and jointly plan and manage initiatives to meet their needs.
At least 3 new income-earning opportunities identified, and enterprise options developed in Uganda, Tanzania and Malawi.
Gender analysis completed to identify constraints and opportunities that enable women to participate in ERI processes, adopt NRM technologies and share benefits of accessing market opportunities.
Tools and methodology for participatory policy analysis and by law formulation including conflict resolution mechanisms available.
PM&E systems institutionalized in the Kenya Agricultural Research Institute (KARI) and used routinely in at least 5 KARI regional research centers.
Community based PM&E systems established in at least five communities working with the Kenya Agricultural Research Institute.
The role and benefits to communities of community based PM&E systems understood, documented and published in peer reviewed journal.

2007 Approach, methods and tools for analyzing and learning from innovation ecologies to accelerate rural innovation developed and being applied by at least one learning alliance.
Socio-economic methodologies for strengthening community-based organizations developed, tested and results published.
Participatory evaluation and monitoring methods, training and materials disseminated in at least five national LA and E-Africa systems.

Impact of PM&E methodologies on enabling resource poor farmers to make effective demands on R&D providers demonstrated and documented in Bolivia and East-Africa countries.
A book published that synthesizes lessons from at least four histories of differing types of innovation as well as documents the institutional learning and change that has resulted from stakeholder analysis of the findings.
Conduct impact Assessment of ERI processes and methodologies to learn from and provide evidence on the extent of impact of ERI to the livelihoods assets, strategies and outcomes.
Document the extent to which new initiatives (e.g. agro-enterprises, NRM farmer's experimentation) are successful, disaggregated by wealth and gender in the pilot communities.
Develop and apply scaling up/out strategies for ERI processes, and engage policy makers and civil society stakeholders in analysis of lessons learnt.
Develop database of FRGs, agroenterprises and INM technologies that link farmers to markets and rural service providers.
Enhance partnerships between NARES and other stakeholders, and build capacity in research and extension organizations that support community interventions to institute ERI activities in three new countries (Mozambique, Rwanda, Kenya, and DR Congo).
Tools and methods developed and in use to assist communities and policy makers to make informed decisions and policies to improve the adoption of NRM practices and innovations, and to link smallholder farmers to profitable markets.
Document the extent to which the poor and women are active in market oriented collective action strategies that directly link NRM to market orientation will enhance collective investment and benefits more than CA targeted to NRM or markets alone.
At least four PhD theses (on partnership and scaling up; gender analysis in ERI; social capital and group dynamics and market opportunities, and impacts of ERI on HIV/AIDS) completed.
Analysis of the role of PM&E in improving project performance and delivery of services by R&D institutions completed and published in peer-reviewed journal.
Lessons on institutionalization of PM&E in National Agricultural Research Institutions (strategies, facilitating factors and challenges) documented, disseminated and applied to other national programmes in Eastern and Southern Africa.

Users: This work will benefit poor farmers, processors, traders, and consumers in rural areas, especially in fragile environments. Farmer-researchers will have improved capacity for innovation. Researchers will receive more accurate and timely feedback from users about acceptability of production technologies and conservation practices. Researchers and planners will profit from methods for conducting adaptive research and implementing policies on natural resource conservation at the micro level.

Collaborators: NARS, NGOs, universities, SP-PRGA, SP-IPM, national agricultural extension service, KS-ILAC Initiative

CGIAR system linkages: Enhancement & Breeding (25%); Crop Production Systems (16.7%), Livestock (8.3%), Protecting the Environment (25%); Training (5%); Information (5%); Organization and Management (15%). Conveners of SP-PRGA; Coordinator of the FPR-IPM project of SP-IPM.

CIAT project linkages: Inputs to PE-1, PE-3, PE-4, PE-5, IP-1, IP-2, IP-3, IP-5, SN-1, and BP-1; outputs from PE-3, PE-4, IP-3, BP-1, and SN-1.

CIAT: SN-3 PROJECT LOG FRAME (2005-2007)

PROJECT: RURAL INNOVATIONS INSTITUTE: PARTICIPATORY RESEARH
PROJECT MANAGER: CARLOS A. QUIROZ (ACTING)

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To develop and apply knowledge, tools, technologies, skills, and organizational principles that contributes to improving human well-being and AES health.	Application of participatory methods, analytical tools, and organizational principles by R&D organizations that result in incorporating farmers and other end-users' needs in integrated agroecosystem management and conservation (IAEM). Use of project products at additional reference sites in two AES (Hillsides and forest margins) of CIAT's mandate in 5 years. Use of project products by a minimum of three institutions outside LAC at end of Year 5. Improvement in end-users' well being at the respective reference sites.	Projects, plans, and reports of national public-sector entities, donors, NGOs, and community-based organizations in the three reference sites and mandated AES of CIAT's mandate, which refer to their use of project products.	
Purpose To develop and disseminate PR principles, approaches, analytical tools, indigenous knowledge, and organizational principles that strengthen the capacity of R&D institutions responding to the demands of stakeholder groups for improved human well-being and AES health.	# R&D organizations applying participatory methods, analytical tools, and organizational principles. # Entities in LAC teaching participatory methods. # Meetings among stakeholder groups. # Participatory projects implemented by R&D institutions.	Impact study. Institutional reports. Publications. Proceedings.	Institutional economic stability. Financing for training activities and publication and dissemination of materials. Institutions willing to prepare and support facilitators and to share information. End-users (above all, farmers) willing to participate.
Output 1 PR approaches, analytical tools, and indigenous knowledge that lead to the incorporation of farmers and other users' priorities in R&D agendas developed for interested institutions.	Two methodological approaches developed or adapted and its analytical tools developed for IAEM	Project reports. Publications.	Good coordination and integration among collaborators. Minimal conflicts for meeting demands. Full participation of stakeholder groups. Field staff fulfilling true facilitator roles. Data available from reference sites. Internet system functioning well.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Output 2 Organizational strategies and procedures for PR.	Two procedures for PR adopted and adapted.	Project reports. Publications.	
Output 3 Professionals and others trained as facilitators of PR.	Nearly 200 professionals, and technical personnel trained through eight events conducted in L.A. countries.	Project reports.	Institutions willing to prepare and support facilitators. Funding available.
Output 4 Material and information on PR approaches, analytical tools, indigenous knowledge, and organizational principles developed.	Number of visits to Web sites. Nearly 80 national and NGO groups reached with information, training materials and technical assistance. Five new publications released on PR and PM&E themes.	Project reports. Publications.	
Output 5 Impact of SN-3 project activities documented.	Number of host countries; Total number of initiated, inactive, and mature CIALs doing research and self-management capacity; Number and diversity of institutions facilitating CIALs; Gender composition; diversity of research themes; number of beneficiaries, micro enterprises formed, community services performed, facilitators and trainers trained, second-order organizations formed, and number of requests for publications and training materials.	Case studies, M&E reports and databases, impact studies.	.
Output 6 CIAT projects and other institutions supported and strengthened in conducting PR.	# CIAT projects incorporating PR methods into their research initiatives. Five second-order organizations established to support CIALs sustainability. Three national R&D institutions and NGOs have established PR processes within their current programs	Project reports. Publications of internal projects and of other institutions.	
Output 7 Capacity of SN-3 team strengthened.	# Research initiatives proposed by young members of the group approved for implementation	Project reports.	

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
	# Individualized and group training events correspond to identified needs. Annual report contributions from team members as reflection of increased ability to prepare technical reports.		

PROJECT SN-4: RURAL INNOVATIONS INSTITUTE: INFORMATION AND COMMUNICATIONS FOR RURAL COMMUNITIES (INFORCOM)

PROJECT DESCRIPTION

Objective: To strengthen local capacity for innovation by better enabling rural communities and the R&D organizations that serve them obtain, generate, and share information and knowledge, with the aid of new information and communications technologies (ICTs).

Outputs:
1. Techniques and tools with which international and national R&D institutions can better share knowledge.
2. Computer-mediated distance-education (e-learning) programs and multimedia products on CD-ROM that convey science-based methods in forms that are useful for development professionals.
3. Strategies for using community Telecenters[2] to integrate the use of ICTs into rural. development
4. Strategies for enabling information intermediaries to construct and share knowledge in rural communities, using ICTs and other communications media
5. Approaches for developing local information systems that reinforce participatory R&D

Milestones:

2005 See details under "measurable indicators" in the accompanying logical framework.

2006 New projects under way in Southeast Asia, Eastern Africa, and in at least one more Latin American country (in addition to Bolivia and Colombia).
Improved e-learning course offered on ex-situ conservation of plant genetic resources. Generic approaches for strengthening local organizations and information intermediaries, with the aid of ICTs, available as multimedia training tools on CD-ROM.
Approaches for enhancing supply-chain information networks implemented by four local organizations in six rural communities in Bolivia.
Local online market information systems developed or improved by four partner organizations in Bolivia.

2007 Approaches devised originally in Latin America for incorporating the use of ICTs into rural development adapted to conditions in Southeast Asia and Eastern Africa with national partners.
Tested approach to e-learning applied with partner organizations to two new topics.

[2] Community telecenters are facilities, operated by local organizations, that offer public access to new information and communications technologies (ICTs) as well as training and orientation in the use of these technologies for development purposes.

Users: The users of the project's outputs are researchers, development professionals and community leaders associated with local organizations (particularly farmer groups, NGOs, and schools). These persons will acquire new tools and approaches that better enable them to help rural people access, manage, and share information needed for solving problems and acting on new opportunities in agriculture.

Collaborators: SN-4 is building alliances with a wide variety of national R&D organizations in Colombia and other countries where it is developing projects. The project is also cultivating close contacts with various international organizations that support the use of ICTs for development, including Fundación Chasquinet (a Latin American initiative based in Ecuador), the Global Knowledge Partnership (GKP), and the global Association for Progressive Communication (APC). In addition to gaining from these organizations' experience and expertise, CIAT can tap into their networks of local partners in developing countries. In its work on e-learning, the project works through REDCAPA (Red de Instituciones Vinculadas a la Capacitación en Economía y Políticas Agrícolas en América Latina y el Caribe (REDCAPA), based in Brazil, and through national partners, such as Colombia's National University.

CGIAR system linkages: Training (30%); Information (60%); Organization and Management (5%); Networks (5%).

CIAT project linkages: SN-4 will provide all Center projects with new means of increasing research impact and obtaining feedback on research products from rural people. The project should be particularly useful to CIAT's new Rural Innovation Institute as a means of strengthening participatory approaches to agroenterprise development, local adaptive research, community-based watershed management and rural planning.

CIAT: SN-4 PROJECT LOG FRAME (2005–2007)

PROJECT: RURAL INNOVATIONS INSTITUTE: INFORMATION AND COMMUNICATIONS FOR RURAL COMMUNITIES
PROJECT MANAGER: NATHAN RUSSELL

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To help the rural poor build sustainable livelihoods by improving the flow of genuinely relevant information among rural communities and research and development (R&D) organizations.	- New options for enhancing livelihoods identified by individuals and organizations in rural communities through improved information access.	Impact evaluation within a sustainable livelihoods framework, based on interviews with key informants and group techniques in selected rural communities.	
Purpose To strengthen local capacity for innovation by better enabling rural communities and the R&D organizations that serve them to obtain, generate, and share information and knowledge, with the aid of new information and communications technologies (ICTs).	- Improved knowledge-sharing (KS) capability in CGIAR centers and national partner organizations. - Better access to CIAT-related methodologies and approaches for national partners. - A greater capacity in local organizations to satisfy demand for knowledge and information in rural communities.	Case studies on learning and change in R&D institutions. Impact evaluation of e-learning courses, development approaches, and training products developed by CIAT and national partners. Case studies on the use of information obtained with the aid of ICTs in target rural communities.	Rural communities can obtain affordable, reliable access to the Internet. National and local organizations commit themselves to providing rural communities with relevant information services. Rural communities prove receptive to a new information culture based on the use of modern ICTs.
Outputs 1. Techniques and tools with which international and national R&D institutions can better share knowledge.	- Knowledge sharing (KS) strategies developed in 2005 with two CGIAR centers, one of the CGIAR Challenge Programs, and two projects involving one or more centers and their national partners. - Web site created in 2005 to provide better access to tools and techniques for improved knowledge sharing and institutional learning. - Three cases of effective knowledge sharing in the CGIAR centers documented in 2005. - Training in the use of KS tools and techniques provided to about 15 CGIAR center staff in 2005.	- Project documents outlining KS strategies. - Documentation of KS cases available online and in print. - Evaluation of training by participants.	- CGIAR centers maintain commitment to developing KS strategies and documenting KS experiences.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
2. Computer-mediated distance-education (e-learning) programs and multimedia products on CD-ROM that convey science-based methods in forms that are useful for development professionals	- Report on lessons learned in preparing and teaching CIAT's first e-learning course (Ex-situ conservation of plant genetic resources) available in 2005. - Improved e-learning course on ex-situ conservation course offered in 2005. - A multimedia training product prepared in 2005 on farmer groups conducting adaptive research for agroenterprise development.	- E-learning report available online. - E-learning course offered in Spanish through the REDCAPA Web site. - Multimedia materials available in Spanish on CD-ROM and online.	- CIAT and partner institution scientists continue dedicating time to e-learning and preparation of multimedia materials.
3. Strategies for using community telecenters to integrate the use of ICTs into rural development	- Generic approach documented in 2005 with two Colombian partners for strengthening local organizations through the use of new ICTs. - Strategies designed in 2005 with four Bolivian partners for linking farmer organizations with community telecenters in four to six communities.	- Generic approach available in Spanish, in print and PowerPoint. - Working document on strategies for linking farmer organizations to community telecenters in Bolivia.	- Community telecenter program implemented by local collaborator in Bolivia, as planned.
4. Strategies for enabling information intermediaries to construct and share knowledge in rural communities, using ICTs and other communications media	- Generic approach documented in 2005 with one Colombian partner for supporting information intermediaries in rural communities. - Supply-chain information networks characterized during 2005 in four to six rural communities of Bolivia, as a basis for strengthening these networks with four local partners.	- Generic approach available in Spanish, in print and PowerPoint. - Working document reporting on characterization of supply-chain information networks and on planned improvements in Bolivia.	- Local organizations collaborate in characterizing supply-chain information networks and designing improvements.
5. Approaches for developing local information systems that reinforce participatory R&D	- Web-based market information systems developed or improved in 2005, with Center support, by one local organization in Bolivia and another in Colombia.	- Market information systems available online.	- Local partners maintain commitment to developing online market information systems.

PROJECT BP-1: IMPACT ASSESSMENT

PROJECT DESCRIPTION

Objective: To improve the capacity of CIAT and partner organizations to allocate research resources efficiently by generating and disseminating appropriate information and tools.

Outputs:
1. Expected impact of future research estimated.
2. Impact of selected past CIAT research monitored.
3. Tools developed to assess the impact of research, both *ex ante* and *ex post*.
4. Institutional capacity for estimating, monitoring, and evaluating research impacts improved.

Gains: Improved allocation of resources can increase the rate of return on investment in agricultural research.

Milestones:

2005 Potential impacts of biofortified beans and cassava on human health and productivity estimated for two countries in Latin America.
Framework developed for assessing the impact of collective action on poverty in upper watersheds.
The economic and institutional impact of cassava systems research in Asia documented.
Results of CIAT organizational culture diagnosis and its implications for center effectiveness finalized and disseminated.

2006 Methodology developed to assess the equity impacts of participatory monitoring and evaluation (PM&E).
Establishment of working paper series on social science, with special emphasis on impact assessment and monitoring and evaluation.

2007 Economic, social and ecological determinants of dietary quality at the individual and household levels estimated.
The impact on poverty of strengthening collective action for watershed management assessed empirically in several catchments of the Andes and Nile basins.

Users: Research planners and researchers in CIAT and partner organizations who make decisions on resource allocation. All stakeholders who need to measure expected returns to investment in agricultural and natural resource management research.

Collaborators: *Future impact of research:* Colombian Ministry of Agriculture; University of Hohenheim, Germany, Harvest Plus Challenge Program, Challenge Program on Food and Water, Systemwide program of collective action and property

rights (CAPRi), Universidad de los Andes, Colombia; Maseno University; World Wildlife Federation; 3 Development Challenges, CIAT projects—genetic resources, cassava in LAC, beans in LAC, forages, and agroenterprises *Impact of past research monitored*: SPIA, SP—PRGA; CIAT projects-- cassava in Asia, beans in Africa, rice, IPRA, Rural Innovation Institute, IPM, and agro enterprises. *Tools and strengthening capacity*: IDS University of Sussex, (UK), IDRC, CGIAR Program on Gender and Diversity, CGIAR initiative on Institutional Learning and Change (ILAC), working groups on CIAT's 3 Development Challenges

CGIAR system linkages: Improving Policies (100%).

CIAT project linkages: All CIAT projects.

CIAT: BP-1 PROJECT LOG FRAME (2005-2007)

PROJECT: IMPACT ASSESSMENT
PROJECT MANAGER: NANCY JOHNSON

Narrative Summary	Measurable Indicators (milestones)	Means of Verification	Important Assumptions
Goal To enhance performance of decision making about resource allocation in the agricultural research and development sectors.	Performance of investment in tropical agricultural research improved.	Research project portfolios in tropical agricultural research.	
Purpose To improve the capacity of CIAT and partner organizations to allocate research resources efficiently by generating and disseminating appropriate information and tools.	Results of impact analysis used in decision-making and priority setting. Research resources allocated more efficiently (expected rate of return to CIAT research portfolios increased).	Scientific publications from BP-1 and other projects. Published planning documents of CIAT and partner organizations. Published minutes of planning meetings in CIAT (BOT, MT, Project Managers) and partner organizations. External reviews of CIAT. Data on use of tools developed at CIAT.	Adequate funding to agricultural research and extension. Decision makers willing to use economic analysis in research priority setting.
Output 1 Expected impact of future research estimated.	2005 Potential impacts of biofortified beans and cassava on human health and productivity estimated. Framework developed for assessing the impact of collective action poverty in watersheds 2007 Economic, social and ecological determinants of dietary quality at the individual and household levels estimated The impact on poverty of strengthening collective action for watershed management assessed empirically in several catchments of the Andes and Nile basins.	Project progress reports, scientific papers and presentation, data bases	Negotiations with Water Challenge Program completed and contract signed by end of 2004. Institutional and financial support for impact assessment maintained. The socio-economic conditions remain stable.

Narrative Summary	Measurable Indicators (milestones)	Means of Verification	Important Assumptions
Output 2 Impact of selected past CIAT research documented**.**	2005 The economic and institutional impact of cassava systems research in Asia documented.	Reports, scientific papers and publications	Institutional and financial support for impact assessment maintained.
Output 3 Tools developed to assess the impact of research, both *ex ante* and *ex post.*	2005 Data base on consumption of beans and cassava set by target populations for Harvest Plus 2006 Methodology developed to assess the equity impacts of different methods of PM&E developed by CIAT projects and partners Ongoing Maintenance and updating of impact assessment databases and information systems	Papers and publications, BP1 web site	Institutional and financial support for impact assessment maintained.
Output 4 Institutional capacity for estimating, monitoring, and evaluating research impacts improved.	2005 Presentation in CIAT on impact assessment conceptual framework Finalize results of organizational culture diagnosis and its implications for center effectiveness	Copies of reports, papers and presentations made within and outside of CIAT. Actions plans and progress reports based on the results of the organizational culture diagnosis	Sufficient institutional and financial support for impact assessment is maintained. Willingness of CIAT staff and partners to use efficiency criteria when making research investments

Narrative Summary	Measurable Indicators (milestones)	Means of Verification	Important Assumptions
	2006 Establishment of working paper series on social science, with special emphasis on IA/M&E Ongoing Support other CIAT projects in impact assessment, e.g. for 2005 Rural Innovation, IPRA, Africa Beans Technical support for users of past IA tools (e.g. Modexc)	Participation of BP1 staff in supporting role in impact assessments and evaluations carried out by other projects. Working paper series, in electronic and paper form	

PROJECT SW-3: SYSTEMWIDE: PARTICIPATORY RESEARCH AND GENDER ANALYSIS

PROJECT DESCRIPTION

Introduction: The Program's goals for Phase Two (2003-2007) have been considerably formed by lessons and experiences that emerged from Phase One (1997-2002). These lessons can be broadly summarized as:

- An absence of a critical mass of Participatory Research (PR) and Gender Analysis (GA) practitioners in agricultural research, particularly in the CG system.
- Little or no focus on gender analysis.
- An unmet demand for capacity development in GA and PR methods.
- While learning and change through methods development is widespread, it does not extend beyond the project life and into the organizations.

Clearly, these lessons necessitate the need for renewed focus on gender analysis with its inextricable linkage to participatory research. This calls for continued focus on building capacity for the use of GA, PR and Impact Assessment (IA) methods and demonstrating the impacts for using such methods. Additionally, and in order to sustain and enhance and extend learning and change to the level of the organization, it is necessary to focus on developing capacity for mainstreaming such approaches, combined with action research to document 'best practices' for organizational learning and change.

Goal: The major goal in Phase Two of the Program is to mainstream gender analysis and equitable participatory research by introducing learning and change in CG centers and NARS so that they can better target the demands of beneficiary groups, particularly poor rural women.

Mainstreaming refers to the following activities: a) capacity development for GA, PR, IA and organizational development; b) established cadre of change agents versed in GA, PR, IA and organizational development skills and networked for support and exchange of experiences; c) establishment of internal working groups to facilitate adaptation of organizational structures/practices to initiate demand driven agenda within their organizations; d) high level external support group that represents interests of clients, particularly poor rural women, and functions as a body to ensure accountability for instituting demand driven agenda in participating institutions.

Outputs:

1. Capacity developed for mainstreaming gender analysis and participatory research in selected CG centers and NARS:
   Small grant**:** Project on Mainstreaming and Support to Partners.
2. Evidence of impact of gender analysis and participatory research methods assessed and methods developed to permit impact assessment results to be effectively integrated into research and development decision-making:
   Small grant: Project on Impact Assessment

3. Established communication strategies for learning and change with partners
   Small grant**:** Project on communication and publications

Gains: Accelerated learning and change from the generation of new, widely applicable methodologies for enhanced Gender Analysis (GA), Participatory Research (PR), Impact Assessment for Institutional Learning and Change (ILAC) and Organizational Development (OD) for mainstreaming these approaches in the practices, structures and processes of organizations. Considerable savings and increased impact from participating CGIAR centers and NARIs through increased and efficient use of these methods. Capacity for these methods will be strengthened and disseminated through an established network of trained trainers from these participating institutions. Poor rural women will be important participants in and beneficiaries of research. The development and adoption of diverse germplasm will be greatly accelerated in major food crops.

Milestones:

2005 At least 12 partner institutions (two CGIAR centers and 10 NARIs) incorporate GA and PR into core (mainstream) Participatory Breeding (PB) and/or Natural Resources Management (NRM) research.
Action research undertaken and tools developed for enabling scientists to capture product and process impact, and to integrate learning from IA into research planning and adaptation.

2006 A core capacity in the partner institutions (at least two CGIAR centers and 10 NARIs) has been institutionalized in terms of people trained in the methods, changes implemented in research organizations, multi-year funding committed and institutional policies adopted, such that the scientific use of GA and PR is an organic part of research, project design, staff recruitment and capacity building in the participating institutions.

2007 Capacity of IARC and NARS scientists to use good practice GA, PR, IA and Organizational development methods is considered strengthened through training of trainers for at least two CG centers and 10 NARIs.

Users: Poor rural women farmers, poor farmers in general, CGIAR centers, NARIs, NGOs and rural grassroots organizations

Measures of Progress/Achievement (Output indicators):

Output 1: Capacity developed for main streaming gender analysis and participatory research in selected CG centers and NARS (2003-5)

- At least 12 robust partnerships are formed with regional networks, prominent national partners, Challenge Programs that have, or potentially have, considerable impact on the rural poor by 2005.
- The nature of collaboration takes the form of either (a) exploiting synergies in objectives, (b) taking opportunities to considerably expand the integration or improve

the quality of the GA&PR practiced, or (c) incorporating GA&GA approaches where they would otherwise be absent or weakly applied.

- GA, PBG and PNRM-working groups are engaged in the partnership processes, as reflected in their work plans by 2005
- Field training manual for GA& PR, IA of ILAC, and Organizational Development structured and widely disseminated. This document should also provide a brief review of existing GA& PR, IA, and OD methods, and draw on best practices in developing guidelines by 2005.
- At least a three-method workshop held for GA, PR, IA of ILAC and OD, training a minimum of 40 participants in a variety of 'best practice' approaches; and follow-up support extended to participants to enable them to continue change process in their respective institutions between 2004-5.
- One training of trainers workshop held for PR, GA, and IA of ILAC, training a minimum of 8 to 10 trainers in a variety of "best practice" approaches; and follow-up support extended to trainers to enable them to provide training and technical support to scientists in their institutes in 2006
- At least two manuals produced on "best practice" in GA, PR, IA of ILAC and OD, based on workshop outcomes. One in 2004 and another in 2005.
- At least 10 collaborative action research activities undertaken through strategic partnerships between 2005-6.
- Institutional analysis conducted with 10 partner institutions and 'best practices' analysed and disseminated through publications by 2005
- An internal working group is formed to spearhead organizational change and mainstream GA&PR in each participating institutions between 2005- 6.
- Mentoring and capacity building provided to partner institutions to guide and lend support to the mainstreaming process between 2004-7.
- Research results published and disseminated on the process of institutionalization through organizational change between 2005-7.

Output 2: Evidence of impact of gender analysis and participatory research methods assessed and methods developed to permit impact assessment results to be effectively integrated into research and development decision-making

- At least three collaborative impact studies are conducted, including an analysis of impact of different PR approaches under contrasting conditions; biophysical, institutional, and policy environments. Results are published as working documents and in professional journals between 2004-7.
- Published results of three collaborative studies and impact of PR and GA methods disseminated to CGIAR liaison contacts, PNRM and PBG, CGIAR libraries, and donor community by 2007.
- Three research briefs and PowerPoint presentations are prepared to highlight the recent evidence on IA of PR and GA in general, and they are widely disseminated to IARCs, NARS, and NGOs between 2005-7.
- Two international workshops are conducted to disseminate results of empirical impact studies in 2005 and in 2007.
- Collaborative action research conducted with at least four CG and NARs partners to develop, test, and assess methods for improving information resulting from IA

(product and process impacts, and assessing the contribution of IA to institutional learning and change) by 2007.
- Discussion paper on IA for institutional learning and change is developed and made available to IARCs, NARs and NGOs by 2007.
- . Two IA capacity development training and methods learning workshops are organized in 2005 and in 2006.

Output 3: Established communication strategies for learning and change with partners
- Site developed that is friendly and accessible to users in developing countries with slow modem connections between 2004-5.
- Site contains a rich set of research findings and resources that are relevant to users, and is regularly updated between 2004-7.
- Systems in place to regularly publicize new GA and PR research results through PRGA-info Listserv, Web, and printed copies to authors, donors, and CGIAR libraries by 2004 and updated continuously till 2007.
- PRGA Program's liaison contacts regularly forward publicity on PRGA to their Center scientists between 2004-7.
- New sources of distribution are identified by 2005.
- Membership to PRGA-info Listserv doubles to 800 members between 2005-7.
- Packaging of research results in 1-2 page brief forms, disseminated both as hard copy and electronic form between 2004-7.
- Mailing list built to include IARC and NARS scientists, NGO practitioners, civil society organizations, and policy makers between 2004-7.

Collaborators: IARCS, NARS, NGOs, Universities, grassroots organizations

The collaboration of the Program with partners has been through provision of small grants, workshops costs, and in-kind contribution of senior staff for joint proposal development and studies. The collaborative arrangements are:

CGIAR system links:
- CIP: has been allocated a small grant for mainstreaming.
- ICARDA: a small grant allocation for mainstreaming and contribution of senior staff time for impact assessment studies and capacity development support for the Water Challenge Program.
- CIMMYT: contribution of senior staff time for a joint impact assessment study; senior staff time for development and implementation of field project on participatory small- machinery project in South Asia.
- ICRISAT: contribution in senior staff time for a joint impact assessment study
- CIAT: contribution of senior staff time for proposal development with the Participatory Research Program (IPRA). Funds for the CIAT beans project. Impact Assessment - CIAT -

NARS:

- Small grants, workshop funds, and senior staff time for capacity development of 10 NARIs in the Eastern, Southern and Central African region.

NGOs

- LiBird: small grant for PPB in maize and learning and change workshop
- CARE/Laos: small grant for assessing the lessons of gender mainstreaming
- CBN- Cassava Biotechnology Network
- EMBRAPA-CNPMF - PPB
- PROINPA
- North East Network - NEN
- Corporación PBA

Universities

- Laos University: small grant for study documenting the development and implementation of a PM&E process with the National Agricultural extension services.
- China Agricultural University: small grant for designing and implementing a study to assess the mainstreaming of participatory research approaches with its various stakeholder.
- Agricultural University of Norway.

CIAT: SW-3 PROJECT LOG-FRAME (2005-2007)

PROJECT: SYSTEMWIDE: PARTICIPATORY RESEARCH AND GENDER ANALYSIS
PROJECT MANAGER: BARUN GURUNG

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal: Mainstream gender analysis and equitable participatory research to promote learning and change in CG centers and NARS so that they can better target the demands of beneficiary groups, particularly poor rural women.	• By the end of 5 years, participating institutions in the CG system and NARs have an increased capacity to use GA&PR methods and mainstream them in their own organizations. • The CG and NARs organizations who have made an attempt to mainstream gender analysis and participatory approaches have been able to better target the demands of beneficiary groups, particularly poor rural women. • A team of trainers, networked to support each other and provide training to others, is established. • Process of incorporating GA and PR into organizational policies and practices well underway in participating CG centers and partner institutions.	• Monitoring and evaluation system indicators for assessing capacity in GA&PR and organizational change. • Impact assessment studies. • External review reports. • Reports of collaborating institutions.	• CGIAR centers and partner institutions willing to become involved in learning and change by committing staff and budget to using GA and PR methods, contributing to capacity development of its members and make the necessary organizational adjustments for integrating such approaches in their organizations
Project purpose: Improve the competencies of the CG System and collaborating institutions to mainstream the use of gender-sensitive participatory approaches in Plant Breeding, and Natural Resources Management research.	• Effective approaches developed and disseminated for mainstreaming GA & PR methods; methods recognized and understood by relevant senior management and staff; and being applied appropriately by at least 70% of institutions supported by Program research and capacity building at the end of 5 years. • Impact of mainstreaming GA&PR approaches documented in multiple studies.	• Monitoring and evaluation system indicators for assessing capacity in GA&PR and organizational change. • Program publications; IARC annual reviews, reports and publications. • Published results of Program's impact studies. • Results of Program partnerships. • External review reports. • Reports of collaborating institutions.	• Donor commitment to the Program constant over the 5-year period. • IARCs and other institutions collaborating with the Program able to include results in the institution's reports and annual reviews. • Stakeholders willing to contribute actively to Program planning and evaluation.

Overall Output I: Capacity developed for mainstreaming in selected CG Centers and NARS.			
Narrative Summary	**Measurable Indicators**	**Means of Verification**	**Important Assumptions**
Specific outputs: 1. Strategic Partnerships formed with organizations that enable the PRGA Program to have a major impact on: (a) integrating GA&PR into agricultural and NRM research practice, and (b) enhancing methods and approaches that help improve the livelihoods of the very poor, particularly rural women.	• At least 12 robust partnerships are formed with regional networks, prominent national partners, Challenge Programs that have, or have the potential to have, considerable impact on the rural poor by 2005. • The nature of collaboration takes the form of either (1) exploiting synergies in objectives, (2) taking opportunities to considerably expand the integration or improve the quality of the GA&PR practiced, or (3) incorporating GA&GA approaches where they would otherwise be absent or weakly applied. • GA, PBG and PNRM-working groups are engaged in the partnership process, as reflected in their work plans by 2005.	• Monitoring and evaluation by the PRGA Program. • Collaborators' reports. • Annual report and Program's Web site.	• Potential partner institutions are willing and interested in collaborating with the PRGA Program. • With support from the Program, working groups are willing and interested in collaborating with different partners. Funding partners interested in supporting fruitful engagement with partners.
2. Development of effective methods and capacity for using GA&PR; organizational development (OD) concepts and skills for mainstreaming these approaches, and impact assessment (IA) of institutional learning and change (ILAC).	• Field training manual for GA& PR, IA of ILAC, Organizational development developed and widely disseminated. This document should also provide a brief review of existing GA& PR, IA, and OD methods, and draw on best practices in developing guidelines by 2005. • At least 3 methods workshop held for GA, PR, IA of ILAC and OD, training a minimum of 40 participants in a variety of 'best practice' approaches; and follow-up support extended to participants to enable them to continue change process in their respective institutions between 2004-5.	• Published field manual • Training reports • Collaborators' reports • Annual report and Program's Web site. • Program publications • Workshop proceedings.	• Potential partner institutions are willing and interested in collaborating with the PRGA Program. • Funding partners interested in supporting capacity building. • IARCS and partner institutions willing to commit budget and human resources for internal capacity development.

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
3. Capacity of IARC and NARS scientists to use "best practice" for GA, PA and IA of ILAC, and OD methods is considerably strengthened through 'training of trainers'.	• 1 training of trainers workshop held for PR, GA, and IA of ILAC, training a minimum of 8-10 trainers in a variety of "best practice" approaches; and follow-up support extended to trainers to enable them to provide training and technical support to scientists in their institutes in 2006. • At least 2 manuals produced on "best practice" in GA, PR, IA of ILAC and OD, based on workshop outcomes. One in 2004 and another in 2005.	• Workshop proceedings • Manuals produced from workshop outcomes • Annual report and Program's Web site. • Collaborators' reports	• Centers and NARS interested in and contributing budget and human resources to participate in workshops and to host local follow-up training.
4. Evaluation studies are conducted to assess opportunities and constraints for mainstreaming GA&PR and a plan of action for implementation is developed.	• At least 10 collaborative action research activities undertaken through strategic partnerships between 2005-6. • Institutional analysis conducted with 10 partner institutions and 'best practices' analyzed and disseminated through publications by 2005. • An internal working group is formed to spearhead organizational change and mainstream GA&PR in each participating institutions between 2005-6. • Mentoring and capacity building provided to partner institutions to guide and lend support to the mainstreaming process between • 2004-7.	• Program publications • PhD dissertation • Program website • Annual Reports • Collaborator's reports • Mentor's reports	• Centers and NARS interested in and contributing budget and human resources to participate in workshops and to learning and change process.
5. Assessment of effects of mainstreaming of GA&PR approaches through organizational change.	• Research results published and disseminated on the process of institutionalization through organizational change between 2005-7.	• Workshop proceedings • Manuals produced from workshop output • Annual report and Program's Web site • Collaborators' reports.	• Centers and NARS interested in and contributing budget and human resources to participate in workshops and to host local follow-up training.

Overall Output II: Evidence of the impact of participatory research (PR) and gender analysis (GA) methods assessed, and methods developed to permit impact assessment (IA) results to be effectively integrated into research and development (R&D) decision making.			
Narrative Summary	**Measurable Indicators**	**Means of Verification**	**Important Assumptions**
Specific outputs: 1. Empirical studies on PR methods in PB and NRM assessed	• At least 3 collaborative impact studies are conducted, including an analysis of impact of different PR approaches under contrasting conditions; biophysical, institutional, and policy environments. Results are published as working documents and in professional journals between 2004-7. • Published results of 3 collaborative studies and impact of PR and GA methods disseminated to CGIAR liaison contacts, PNRM-wg and PBG, CGIAR libraries, and donor community by 2007. • Three research briefs and PowerPoint presentations are prepared to highlight the recent evidence on IA of PR and GA in general, and they are widely disseminated to IARCs, NARS, and NGOs between 2005-7. • Two international workshops are conducted to disseminate results of empirical impact studies in 2005 and in 2007. .	• IA studies and methods published as PRGA Working documents. • Program's publications, briefs, presentations, peer-reviewed journal articles, books, Web site. • Annual reports, workshop proceedings	• IARCs and partner institutions willing to collaborate in IA. • Funds available to conduct empirical studies.
2. Tools and methods developed and disseminated to enable scientists to capture impact of products (i.e. crop technologies and management practices) and innovation processes, and integrate learning from impact assessment into research planning and research priority setting.	• Collaborative action research conducted with at least 4 CG and NARs partners to develop, test, and assess methods for improving information resulting from IA (product and process impacts, and assessing the contribution of IA to institutional learning and change by 2007. • Discussion paper on IA for institutional learning and change is developed and made available to IARCs, NARs and NGOs by 2007. • Two IA capacity development training and methods learning workshops are organized in 2005 and in 2006	• Published studies (PRGA working documents) on IA tools and methods, and assessments of their effectiveness in improving the usefulness of IA and stimulating organizational learning and change. • Annual reports, collaborators' reports, Program's Web site.	• Partner institutions interested and willing to participate in action research. • Funding partners interested in supporting these initiatives

Overall Output III: Communication strategies for learning and change with Partners.			
Narrative Summary	**Measurable Indicators**	**Means of Verification**	**Important Assumptions**
Specific outputs: 1. PRGA Program's interactive Web site launched and attracts a large and diverse range of users who not only read, but also contribute to the site's contents	• Site developed that is friendly and accessible to users in developing countries with slow modem connections between 2004-5. • Site contains a rich set of research findings and resources that are relevant to users, and is regularly updated between 2004-7.	• Monthly Web site statistics: number of hits, visitor sessions, and downloads. • Monitoring and evaluation system of the Program.	• Users have the interest and time to contribute to Web site contents. • A qualified individual (Communications Officer) is identified to manage and update the site's contents. • Donors interested in providing support for the technical development of the new site and the Program's capacity for communications.
2. Awareness of PRGA research results and other publications is considerably heightened, particularly among agricultural scientists	• Systems in place to regularly publicize new GA and PR research results through PRGA-info Listserv, Web, and printed copies to authors, donors, and CGIAR libraries by 2004 and updated continuously till 2007. • PRGA Program's liaison contacts regularly forward publicity on PRGA to their Center scientists between 2004-7. • New sources of distribution are identified by 2005. • Membership to PRGA-info Listserv doubles to 800 members between 2005-7.	• PRGA-info Listserv membership (number and profession). • Monthly Web site statistics, particularly downloaded publications. • Monitoring and evaluation system of the Program.	• PRGA Program has the capacity to strengthen relationships with its liaison contacts and ensure their commitment to disseminating information on GA&PR. • A qualified individual (Communications Officer) is identified to promote awareness. • Donors are interested in supporting the Program's capacity for communications.
3. Research results published in media favored by nonacademic audiences and researchers not well acquainted with the PRGA field.	• Packaging of research results in 1-2 page brief forms, disseminated both as hard copy and electronic form between 2004-7. • Mailing list built to include IARC and NARS scientists, NGO practitioners, civil society organizations, and policy makers between 2004-7.	• Mailing list membership for briefs (numbers and professions).	• Donors interested in supporting the Program's capacity for communications and mailing costs. • A qualified individual (Communications Officer) is identified to prepare briefs from PRGA Program's research publications.

Appendix II

Financial Tables for 2005-2007

(July 2004)

Appendix III

List of Acronyms and Abbreviation

List of Acronyms and Abbreviations

Acronyms

ACERG	Asociación de Centros Educativos del Cañón del Río Garrapatas, Colombia
ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AfNet	African Network for Soil Biology and Fertility
AHI	African Highland Initiative
APC	Association for Progressive Communications
ARI	Agricultural Research Institute, Tanzania
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASOBOLO	Asociación de la Cuenca del Río Bolo, Colombia
ASOCOLFLORES	Asociación Colombiana de Exportadores de Flores
AVRDC	Asian Vegetable Research and Development Center
BBA	Federal Biological Research Centre for Agriculture and Forestry, France
BCP	Biofortification Challenge Program
Bean/Cowpea CRSP	Bean/Cowpea Collaborative Research Support Program (*of the* Univ. Georgia, USA)
BOT	Board of Trustees (*of* CIAT)
CA	Département des Cultures Annuelles (*of* CIRAD)
CAAS	Chinese Academy of Agricultural Sciences
CAMBIA	Centre for the Application of Molecular Biology to International Agriculture, Australia
CAPRi	Collective Action and Property Rights
CARDER	Corporación Autónoma Regional de Risaralda, Colombia
CARE	Cooperative for American Relief Everywhere, USA
CATIE	Centro Agrónomico Tropical de Investigación y Enseñanza, Costa Rica
CBN	Cassava Biotechnology Network
CEGA	Centro de Estudios de Ganadería y Agricultura, Colombia
CENIBANANO	Centro de Investigaciones del Banano, Colombia
CENICAFE	Centro de Investigaciones del Café, Colombia
CENIPALMA	Centro de Investigación en Palma de Aceite, Colombia
CENTA	Centro Nacional de Tecnología Agropecuaria, El Salvador
CFP	Centro Fitogenético Pairumani, Bolivia
CIAT	Centro de Investigación Agrícola Tropical, Bolivia
CIDA	Canadian International Development Agency
CIFOR	Centre for International Forestry Research, Indonesia
CIMMYT	Centro Internacional para Mejoramiento de Maiz y Trigo, Mexico
CIP	Centro Internacional de la Papa, Peru
CIPASLA	Consorcio Interinstitucional para una Agricultura Sostenible en Laderas, Colombia
CIPAV	Fundación del Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria, Colombia
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France
CLAYUCA	Consorcio Latinoamericano y del Caribe de Apoyo a la Investigación y Desarrollo de la Yuca, *based in* Colombia
CLODEST	Comité Local para el Desarrollo Sostenible de la Cuenca del Río Tascalapa, Honduras
CNPMF	Centro Nacional de Pesquisa de Mandioca e Fruticultura Tropical (*of* EMBRAPA)
CODESU	Corporación para el Desarrollo Sostenible de Ucayali, Peru
COLCIENCIAS	Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología "Francisco José de Caldas"
CONDESAN	Consorcio para el Desarrollo Sostenible de la Ecorregión Andina, Peru
CORPOICA	Corporación Colombiana de Investigación Agropecuaria
CRCTPP	Cooperative Research Centre for Tropical Plant Pathology, Australia
CRI	Crop Research Institute, Ghana
CRS	Catholic Relief Services, USA

CSIRO	Commonwealth Scientific and Industrial Research Organisation, Australia
CTCRI	Central Tuber Crops Research Institute, India
CURLA	Centro Universitario Regional del Litoral Atlántico, Honduras
CVC	Corporación Autónoma Regional del Valle del Cauca, Colombia
DANAC	La Fundación para la Investigación Agrícola—Danac, Venezuela
DANIDA	Danish International Development Agency, Denmark
DBT	Department for Biotechnology and Biological Control (*of the* Univ. Kiel, Germany)
DFID	Department for International Development, UK
DGIS	Directorate-General for International Co-operation, the Netherlands
DICTA	Dirección de Ciencia y Tecnología Agropecuaria, Honduras
DNP	Departamento Nacional de Planeación, Colombia
EAP-Zamorano	Escuela Agrícola Panamericana *at* Zamorano, Honduras
EARO	Ethiopian Agricultural Research Organization
EC	Economic Commission (*of the* European Union)
ECABREN	Eastern and Central Africa Bean Research Network
ECLAC	Economic Commission for Latin America and the Caribbean
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária
EPMR	External Program and Management Review (*of* CIAT)
ETH	also ETHZ; Eidgenössische Technische Hochschule—Zürich, Switzerland
E-TIP	Ecologia's Environmental Technical Information Project (online service)
FAO	Food and Agriculture Organization of the United Nations
FCRI	Field Crop Research Institute, Thailand
FEDEARROZ	Federación Nacional de Arroceros, Colombia
FIDAR	Fundación para la Investigación y el Desarrollo Agroindustrial Rural, Colombia
FLAR	Fondo Latinoamericano y del Caribe para Arroz de Riego, *based at* CIAT
FONAIAP	Fondo Nacional de Investigaciones Agropecuarias, Venezuela
FPR-IPM	Farmer Participatory Research for IPM Project (*of the* SP-IPM *and* SP-PRGA)
GEF	Global Environment Facility (*of the* UNDP, UNEP, *and* World Bank)
GRU	Genetic Resources Unit (*of* CIAT)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
GWG	Gender Working Group (*of the* SP-PRGA)
HAP	Hillside Agricultural Program, Haiti
IAEA	International Atomic Energy Agency, Austria
IAR&T	Institute for Agricultural Research and Training, Nigeria
IBSRAM	International Board for Soil Research and Management, Thailand
ICA	Instituto Colombiano Agropecuario
ICARDA	International Center for Agricultural Research in the Dry Areas, Syria
ICER	Internally Commissioned External Review (*of* CIAT)
ICIPE	International Centre of Insect Physiology and Ecology, Kenya
ICRAF	International Centre for Research in Agroforestry, Kenya
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics, India
ICTA	Instituto de Ciencia y Tecnología Agrícola, Guatemala
ICWG—CC	Inter-Center Working Group on Climate Change (*of the* CGIAR)
IDEAM	Instituto de Hidrología, Meteorología y Estudios Ambientales, Colombia
IDIAP	Instituto de Investigación Agropecuaria de Panamá
IDRC	International Development Research Centre, Canada
IDS	Institute for Development Studies, UK
IER	Institut d'Economie Rurale du Mali
IFDC	International Fertilizer Development Center, USA
IFPRI	International Food Policy Research Institute, USA
IGAC	Instituto Geográfico "Agustín Codazzi", Colombia
IGDN	Inter-American Geospatial Data Network
IGER	Institute of Grasslands Environment Research, UK
IIA	Instituto de Investigaciones Avícolas, Cuba

IIA	Instituto de Investigaciones Agropecuarias, Venezuela
IIASA	International Institute for Applied Systems Analysis, Austria
IICA	Instituto Interamericano de Cooperación para la Agricultura, Costa Rica
IILA	Instituto Italo-Latino Americano, Italy
IITA	International Institute of Tropical Agriculture, Nigeria
ILAC	Institutional Learning and Change
ILRI	International Livestock Research Institute, Kenya
INBIO	Instituto Nacional de Biodiversidad, Costa Rica
INERA	Institut de l'Environnement et de Recherches Agricoles, Burkina Faso
InforCom	Information and Communications for Rural Communities
INIA	Instituto de Investigaciones Agropecuarias, Chile
INIA	Instituto Nacional de Investigación Agraria, Peru (*now* INIAA)
INIA	Instituto Nacional de Investigación Agropecuaria, Uruguay
INIA	Instituto Nacional de Investigaciones Agrícolas de Venezuela
INIAA	Instituto Nacional de Investigación Agraria y Agroindustrial, Peru (*formerly* INIA)
INIAP	Instituto Nacional Autónomo de Investigaciones Agropecuarias, Ecuador (*formerly* Instituto Nacional de Investigaciones Agropecuarias)
INIFAP	Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, Mexico
INIVIT	Instituto de Investigaciones de Viandas Tropicales, Cuba
INPA	Instituto Nacional de Pesquisas da Amazônia, Brazil
INPE	Instituto Nacional de Pesquisas Espaciais, Brazil
INRAB	Institut National des Recherches Agricoles du Bénin
INRAN	Institut National des Recherches Agronomiques du Niger
INTA	Instituto Nacional de Tecnología Agropecuaria, Argentina
INTA	Instituto Nicaragüense de Tecnología Agropecuaria
IPCA	Proyecto de Investigación Participativa en Centroamérica, *based in* Honduras
IPGRI	International Plant Genetic Resources Institute, Italy
IPP	Institute for Plant Protection, Germany
IPRA	Investigación Participativa en Agricultura/*Participatory Research in Agriculture, based at* CIAT
IRD	Institut de Recherche pour le Développement, France (*formerly* ORSTOM)
IRRI	International Rice Research Institute, the Philippines
ISABU	Institut des Sciences Agronomiques du Burundi
ISAR	Institut des Sciences Agronomiques du Rwanda
ITRA	Institut Togolais de Recherche Agronomique
IVITA	Instituto Veterinario de Investigaciones Tropicales y de Altura, Peru
IWMI	International Water Management Institute, Sri Lanka (*formerly* International Irrigation Management Institute)
JIRCAS	Japan International Research Center for Agricultural Sciences
KARI	Kenya Agricultural Research Institute
KEMRI	Kenya Medical Research Institute
KSU	Kansas State University, USA
Lempira Sur	FAO project in Honduras to change slash-and-burn agriculture
LSU	Louisiana State University, USA
MADR	Ministerio de Agricultura y Desarrollo Rural, Colombia
MinAmbiente	Ministerio del Medio Ambiente, Colombia
MIS	*also* MIS Group; Management and Information Systems Research Group (*of the* Univ. York, UK)
MSU	Michigan State University, USA
MT	Management Team (*of* CIAT)
NARO	National Agricultural Research Organization, Uganda
NCAR	National Center for Atmospheric Research, USA
NCGR	National Center for Genome Resources, USA
NEN	North East Network
NLH	Norges Landbrukshøgskole (Agricultural University of Norway)

NRCRI	Natural Root Crops Research Institute, Nigeria
NRI	Natural Resources Institute, UK
NRMG	Natural Resource Management Group (*of the* SP-PRGA)
OFI	Oxford Forestry Institute, UK
ORE	Organization for the Rehabilitation of the Environment, Haiti
ORSTOM	L'Institut Français de Recherche Scientifique pour le Développement en Coopération (*now* IRD)
PABRA	Pan-Africa Bean Research Alliance
PASOLAC	Programa de Agricultura Sostenible de Laderas en Centro América
PBA	Corporación PBA, Colombia
PBG	Plant Breeding Group (*of the* SP-PRGA)
P*h*Action	Global Post-*h*arvest Forum
PRGA	Participatory Research and Gender Analysis
PRI	Plant Research International, Netherlands
PROCITROPICOS	Programa Cooperativo de Investigación y Transferencia de Tecnología para los Trópicos Suramericanos
PRODAR	Programa de Desarrollo de la Agroindustria Rural para América Latina y el Caribe, *based in* Costa Rica
PROFRIJOL	Programa Cooperativo Regional de Frijol para Centro América, México y el Caribe
PROFRIZA	Proyecto Regional de Frijol para la Zona Andina
PROINPA	Fundación Promoción e Investigación de Productos Andinos, Bolivia
PRONATTA	Programa Nacional de Transferencia de Tecnología Agropecuaria, Colombia
RDA	Rural Development Administration, Korea
REDCAPA	Red de Instituciones vinculadas a la Capacitación en Economía y Políticas Agrícolas en América Latina y el Caribe
RII	Rural Innovation Institute
RIVM	Rijksinstitut voor Volksgezondheid en Milienhygiene (National Institute of Public Health and Environmental Protection), the Netherlands
SABRN	South Africa Bean Research Network
SACCAR	Southern Africa Center for Cooperation in Agricultural Research and Training
SARNET	Southern Africa Root Crops Research Network
SDC	Swiss Agency for Development and Cooperation
SEA-CIAS	Secretaria de Estado de Agricultura – Centro de Investigaciones Agrícolas del Sureste, Dominican Republic
SEARCA	Southeast Asia Regional Center for Graduate Study and Research in Agriculture
SENA	Servicio Nacional de Aprendizaje, Colombia
SIBTA	Bolivian Agricultural Technology Development
SINCHI	Instituto Amazónico de Investigaciones Científicas, Colombia
SINGER	The CGIAR System-wide Information Network for Genetic Resources
SLU	Sveriges Lantbruksuniversitet (Swedish University of Agricultural Sciences)
SP-IPM	Systemwide Program on Integrated Pest Management (*of the* CGIAR)
SP-PRGA	The CGIAR Systemwide Programme on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation
SRI	Soil Research Institute, Ghana
SWNM	The CGIAR Systemwide Program on Soil, Water & Nutrient Management
TAC	Technical Advisory Committee (*of the* CGIAR)
TCA	Tratado de Cooperación Amazónica
TIP	Traditional Irrigation Programme, Tanzania
TSBF	Tropical Soil Biology and Fertility Programme, Kenya (*now* TSBFI)
TSBFI	Tropical Soil Biology and Fertility Institute (*of* CIAT, *formerly* TSBF)
UBC	University of British Columbia, Canada
UCor	Universidad Católica de Córdoba, Argentina
UCR	Universidad de Costa Rica
UNA	Universidad Nacional Agraria, Nicaragua
UNAH	Universidad Nacional Autónoma de Honduras
UNDP	United Nations Development Programme

UNEP	United Nations Environment Programme
UNIVALLE	Universidad del Valle, Colombia
UPWARD	Users' Perspectives With Agricultural Research and Development, *based in* the Philippines
USDA	United States Department of Agriculture
WARDA	West Africa Rice Development Association, Cote d'Ivoire
WFCP	Water for Food Challenge Program, Sri Lanka
WRI	World Resources Institute, USA
WV	World Vision, USA
WWF	World Wildlife Federation, USA
WWW	World Wide Web

Abbreviations

Ac/Ds	The first pair of transposons discovered (biotechnology)
ACMV	African cassava mosaic virus
AES	Agroecosystem
AFS	Agroforestry systems
Al	Aluminum
ARIs	Advanced research institutes
AROs	Advanced research organizations
AYT	Advanced yield trials
BCMV	Bean Common Mosaic Virus
BGBD	Below-ground biodiversity
BMP	Best management practices
C	Carbon
CA	Central America
CBB	Cassava bacterial blight; *also* Common bacterial blight of beans
CBWM	Community-based watershed management
CC	Climate change
CD-ROM	Compact disk—read-only memory
CFSD	Cassava frogskin disease
CH_4	Methane (a pollutant)
CIALs	Comités de Investigación Agrícola Local (Colombia)
CLOs	Comités locales (local committees)
CO_2	Carbon dioxide (a pollutant)
DCs	Developed countries
DNA	Deoxyribonucleic acid
DS	Decision support
ERI	Enabling Rural Innovation
ESTs	Expressed sequence tags (biotechnology)
FM	Forest margins
FPR	Farmer participatory research
FTE	Full-time equivalent
GA	Gender analysis
GCC	Global climate change
GHG	Greenhouse gases
GIS	Geographic information systems
GKP	Global Knowledge Partnership
GM	Genetically modified
GOs	Governmental organizations
GWP	Global warming potential
HS	Hillsides

IA	Impact Assessment
IAEM	Integrated agroecosystem management and conservation
IARCs	International agricultural research centers (the CGIAR system)
ICTs	Information and communication technologies
INIAs	Instituciones Nacionales de Investigación Agropecuaria (national institutions for agricultural and livestock research)
IPDM	Integrated Pest and Disease Management
IPM	Integrated pest management
IPR	Intellectual property rights
ISFM	Integrated soil-fertility management
KS	Knowledge-Sharing
LA	Latin America; Latin American
LAC	Latin America and the Caribbean
LDCs	Lesser developed countries
LIMS	Laboratory information management systems
LoRSDIs	Local rural sustainable development initiatives
M&E	Monitoring and evaluation
MAS	Marker-assisted selection
MTA	Material transfer agreement (used in germplasm exchange)
MTP	Medium-Term Plan (CIAT)
N	Nitrogen
N_2O	Nitrous oxide (a pollutant)
NARES	National agricultural research and extension systems
NARIs	National agricultural research institutes
NARS	National agricultural research systems
NGOs	Nongovernmental organizations
NRM	Natural resource management
NZ	New Zealand
OD	Organizational Development
P	Phosphorus
PB	Plant breeding
PM&E	Participatory monitoring and evaluation
PNRM	Participatory natural resources management
PPB	Participatory plant breeding
PR	Participatory research
PRR	Phytophthora Root Rot
PYT	Preliminary yield trials
QTLs	Quantitative trait loci
R&D	Research and development
RAeD	Rural Agro-enterprise Development
RHBV	Rice “hoja blanca” virus (rice white leaf virus)
RIIs	Research intensive institutions
R-to-C	Resource-to-consumption *framework*
SLM	Sustainable Land Management
SP	Systemwide program (*of the* CGIAR)
SROs	Specialized research organizations
SRT	Single row trials
SS	Senior staff (*of* CIAT)
TLA	Tropical Latin America