SUMMARY ANNUAL REPORT 2005
CIAT Project on Saving Agrobiodiversity
SB-01/02

Genetic Resource Unit

CIAT
DECEMBER, 2005

Project SB-1/2: Conservation and Use of Tropical Genetic Resources

PROJECT DESCRIPTION

Objective: To conserve the FAO Designated Collections and employ modern biotechnology to identify and use genetic diversity for broadening the genetic base and increasing the productivity of mandate and selected non-mandate crops.

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. Increase efficiency of breeding program using genomics tools
4. Mandate crops 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 devolved for cassava. 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. Isogenic of QTL in rice developed and tested. Gene expression studies. Technology transfer for rapid propagation system to NARS. Testing of Ac/DS population for gene identification.

2006 Scaling up of marker assisted selection and transformation established for rice bean and cassava. High through put screening for selected tropical fruits initiated. 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.

2007 Data mining (SNIPs) in *ex situ/ in situ* collections of wild relatives of beans, cassava and forages for genes of economic importance (drought, starch). Field testing for transformed cassava. Gene flow studies diffused to NARS. Upgrading Plan completed. Safety duplicates at CIMMYT and CIP. Biofortified bean and cassava varieties in field testing. Methods for rapid multiplication of tropical fruit germplasm diffused to NARS. Genes for drought resistance in beans and cassava compared.

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

Collaborators: IARCs (IPGRI through the Systemwide Genetic Resources Program, CIP, and IITA through root and tuber crop research, IFPRI through biofortification proposal and CATIE); NARS (CORPOICA, ICA, EMBRAPA, IDEA, INIAA, INIFAP, UCR, INIAs); USDA; AROs (IRD, CIRAD, Danforth Center, CAMBIA, NCGR, and universities—Cornell, Yale, Clemson, Kansas State, Bath, Hannover, Rutgers, Ghent, Gembloux); biodiversity institutions (I. von Humboldt, CONABIO, INBio, SINCHI, Smithsonian); corporations and private organizations.

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-1/2 PROJECT LOG FRAME (2005-2007)

PROJECT: **CONSERVATION AND USE OF TROPICAL GENETIC RESOURCES**
PROJECT MANAGER: **JOE TOHME (BRU)/ D.G. DEBOUCK (GRU)**

Narrative Summary	Measurable Indicators	Means of Verification
Goal To contribute to the sustainable increase of productivity and quality of mandated and other priority crops, and the conservation of agrobiodiversity in tropical countries.	CIAT scientists and partners using biotechnology information and tools in crop research. Genetic stocks available to key CIAT partners.	CIAT and NARS publications. Statistics on agriculture and biodiversity.
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.	Information on diversity of wild and cultivated species. Mapped economic genes and gene complexes. Improved genetic stocks, lines, and populations.	Publications, reports, and project proposals.
Output 1 Genomes characterized of wild and cultivated species of mandate and non-mandate crops and of associated organisms.	Molecular information on diversity of mandated and nonmandated crops species, and related organisms. Bioinformatic techniques implemented. QTLs for yield component in rice, for nutrition traits in beans and cassava, and for nitrification and Al tolerance in *Brachiaria*.	Publications, reports, and project proposals. Germplasm. Availability of a laboratory information manage system (LIMS).
Output 2 Genomes modified: genes and gene combinations used to broaden the genetic base of mandated and nonmandated crops.	Transgenic lines of rice and advances in cassava, beans, *Brachiaria*, and other crops. Cloned genes for iron, zinc and drought traits Cloned genes and preparation of gene constructs. Information on new transformation and tissue culture techniques.	Publications, reports, and project proposals. Germplasm.
Output 3 Collaboration with public- and private-sector partners enhanced.	CIAT partners in LDCs using information and genetic stocks. New partnerships with private sector.	Publications. Training courses and workshops. Project proposals.
Narrative Summary	**Measurable Indicators**	**Means of Verification**
Output 4 Mandated crops conserved and multiplied as per international standards.	Germination rates for long-stored materials. Cost per accession/year, compared with other gene banks.	Visits to GRU substations and conservation facilities.
Output 5 Germplasm available, restored, and safely duplicated.	Number of germplasm requests received and satisfied annually. Users received germplasm and data. Users asked for novel germplasm and data.	Visits to multiplication plots. Reports on requests and delivery. Number of core collections multiplied and shipped.
Output 6 Designated Collections made socially relevant.	Landrace diversity restored to farmers. Farmers use new varieties. Breeders use novel genes.	Germplasm catalogs. Plant variety registration logs. National catalogs.
Output 7 Strengthen NARS for conservation and use of Neotropical plant genetic resources.	NARS germplasm collections conserved. Number of trainees trained at CIAT. Number of universities and NARS using training materials.	Country questionnaires. Courses registered. Distribution and sales of training materials.
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.

Annex 2 CG Performance Measurement. Output Template

Project SB1/2 (GRU)	Output	Output target 2005	Category of Output target	Achieved?
1.1.	Backlogs cleared/ introduced	2,000 materials/ year	materials	no (1,636)
1.2.	Materials planted	6,520 materials/ 2005	materials	yes (11,060)
1.3.	Materials regenerated	3,400 materials/ 2005	materials	yes (7,852)
1.4.	Materials processed	2,000 materials/ 2005	materials	yes (8,875)
2.1.	Materials cleaned	4,500 materials/ 2005	materials	yes (4,710)
2.2.	Materials distributed	Unpredictable target	materials	yes (8,480)
2.2.	Data available	New web page	practice (information product)	yes
2.4.	Safety back-ups	2,000 at CIMMYT	materials	yes (3,400)
3.1.	Publications	3 articles in refereed journals	Knowledge	yes
4.1.	Training	Course and NARS trained	Capacity	yes

Categories of output targets to be used are materials, policy strategies, practices, capacity, and other kinds of knowledge.

SUMMARY ANNUAL REPORT 2005

Genetic Resources Unit
SB-01/02 PROJECT

Title: Integrated Conservation of Neotropical Plant Genetic Resources

3.1. Staff:

Daniel G. Debouck, Head, PhD (80%)
Alba Marina Torres, Biologist, M.Sc. (on study leave in 2005)
Graciela Mafla, Biologist (100%)
Julio C. Roa, Biologist (has retired in 2005)
César Ocampo, Biologist, M.Sc. (100%)
Orlando Toro, Technician (100%)
Arsenio Ciprián, Technician (100%)
Roosevelt Escobar, Biologist, M.Sc. (50%)
Benjamin Pineda, Ing. Agr., M.Sc. (has retired in 2005)
Norma Cristina Flor, Ing. Agr. (has left in 2005)
Ericson Aranzales, Ing. Biotec. (has joined in 2005)
Maria del Socorro Balcazar, Bacteriologist (100%)
Jesús M. Salcedo, Biologist (100%)
Manuel G. Moreno, Ing. Biotec. (has joined in 2005)
Rosa I. González, Bacteriologist, M.Sc. (100%)
Guillermo Enrique Rueda Q., Telematic Engineer (100%)
Carmenza Llano, Administrative Assistant (100%)

3.2. Partners/ Cooperators:

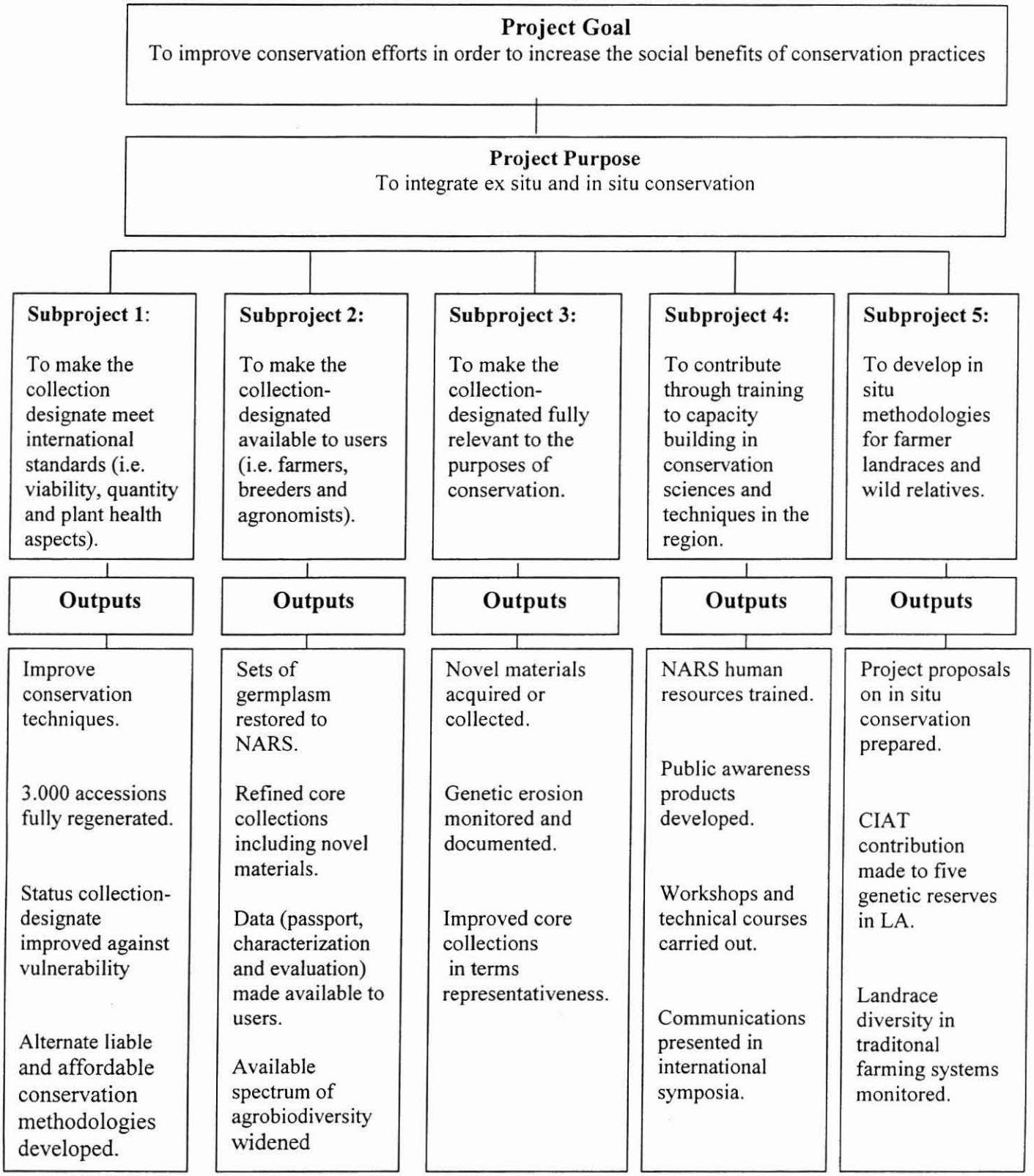
Within CIAT:

Steve Beebe (IP-1), Matthew Blair (IP-1), Lee Calvert (IP-2), Hernán Ceballos (IP-3), Elizabeth Alvárez (IP3-IP1), Andrew Jarvis (PE-4), Carlos Lascano (IP-4), Zaida Lentini (SB-02), John Miles (IP-4), Michael Peeters (IP-4), Joe Tohme (SB-02).

Outside CIAT:

MSc. Rodolfo Araya, University of Costa Rica, Costa Rica
Dr. Hans Jorg Jacobsen, University of Hannover , Germany
Dra. Inés Sánchez, CORPOICA, Colombia
Dr. Mario Lobo, CORPOICA, Colombia
Dr. Samy Gaiji, SINGER, IPGRI, Italy
Dr. Jane Toll, SGRP, IPGRI, Italy
Dr. Jean Henson, ILCA, Ethiopia
Dr. Bonwoo Koo, IFPRI, USA
Dr. Marleni Ramírez, IPGRI – Americas, Colombia
Dr. Katy Williams, USDA, USA
Dr. Molly Welsh, USDA, USA

Genetic Resources Unit work breakdown structure



Genetic Resources Unit Logical Framework
Sub-Project #1: The International Standards

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To make the FAO Designate Collections complying with the International Standards	ICER'95 and ICER'97 recommendations met	FAO Commission experts visits	
Purpose Our purpose is to multiply and conserve the Designate Collections under the highest standards of quality and cost-effectiveness	Germination rates for long stored materials Costs per accession, per year as compared to other genebanks	Visits to GRU multiplication substations and conservation facilities	Sustained and appropriate funding Staff security guaranteed Services delivered on time Support in documentation delivered
Output 1.1 Backlogs of introduced materials processed	Backlog materials presented to ICA and multiplied in quarantine glass-houses	Visits to quarantine glass-houses On-line consultations of GRU system	Agreement ICA-CIAT renewed and funded Quarantine glass-house space available in different altitudes
Output 1.2 Backlogs of materials pending on multiplication multiplied	Multiplication glass-houses/ plots with backlog materials	Visits to multiplication plots in different substations	Availability of manpower and field equipment
Output 1.3 Materials pending on regeneration regenerated (incl. In vitro)	Regenerated accessions/ year	Visits to regeneration plots in different substations/ in vitro Lab	Availability of manpower and field equipment
Output 1.4 Materials processed into final packing	Processed accessions/ year	Visits to cold store facilities On-line consultations of GRU System	Availability of manpower and lab equipment
Output 1.5 Improved conservation techniques	Savings in maintenance costs Longer periods between regenerations	Publications in refereed journals	Availability of students and Staff time

Sub-Project #2 : the Germplasm Available, Restored and Safe Duplicated

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To make the FAO Designate Collections available to users, inside and outside CIAT	ICER'95 and ICER'97 recommendations met Distribution records	FAO experts visits Consultations of users	
Purpose Our purpose is to distribute the Designate Collections to any bona fide user through MTAs	Number of germplasm requests received and satisfied annually	Checks of correspondence about MTAs	Sustained and appropriate funding Agreement with FAO goes on Services delivered on time Support in documentation delivered
Output 2.1 FAO Designate Collections cleaned against seed borne diseases (incl. In vitro)	Accessions tested in SHL and cleaned in special multiplication plots/ glasshouses	Visits to SHL/ multiplication plots Reports of external experts	Participation of CIAT virologists and pathologists
Output 2.2 Germplasm, passport and characterization data available to users	Users receive germplasm and data Users ask for novel germplasm and data	On-line consultations on the InterNet	CIAT Information Unit contributes to the re-engineering of databases Budget for recovering databases
Output 2.3 National collections restored to NARS	Accessions of national collections dispatched	Checks in genebank(s) of original country	Agreements with quarantine authorities allow effective shipments GRU enabled to multiply all collections
Output 2.4 FAO Designate Collections safe duplicated (incl. In vitro)	Accessions sent annually to CIMMYT and CIP	Visits to CIMMYT and CIP	Agreements with quarantine authorities allow effective shipments GRU enabled to multiply all collections
Output 2.5 Refined core collections	Breeders and agronomists use wider germplasm through core collections	Requests for core collections Core collections multiplied and shipped	GRU enabled to multiply all collections Cooperation with BRU for molecular assessment
Output 2.6 Improved disease indexing techniques	Savings in SHL costs Higher numbers of accessions processed by SHL	Publications in refereed journals	Availability of students Participation of CIAT virologists and pathologists

Sub-Project # 3: the Genetic and Social Relevance of the Conservation

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To make the FAO Designate Collections genetically and socially relevant	Farmers recover landraces from GRU Breeders find novel genes in collections	Surveys of landrace diversity	
Purpose Our purpose is to conserve Designate Collections that meet users' needs today and tomorrow	Landrace diversity restored back to farmers (e.g. Seeds of Hope project)	Comparisons of landrace diversity over time Genes included in novel varieties	Sustained and appropriate funding Staff security guaranteed International collecting possible Support in documentation delivered
Ouput 3.1. Designate collections better characterized	Genepools and species relationships further defined	Germplasm catalogs On-line consultations on the InterNet Publications	Collaborations with AROs, CIAT BRU and IP projects Support in documentation
Output 3.2 Novel materials acquired or collected	Recently acquired/ collected materials in quarantine glass-houses	Visits to quarantine glass-houses On-line consultations of GRU system Publications	Agreement between country of origin and CIAT Quarantine matters cleared
Output 3.3 Genetic erosion monitored and documented	Endangered populations/ varieties identified/ mapped	Comparative mapping Publications	Collaboration with CIAT GIS laboratory and regional projects
Output 3.4 Unique genes better sampled and characterized	Farmers use new varieties Breeders use novel genes	Plant Variety registration acts and national catalogs	Collaboration with CIAT BRU, IP projects and GIS

Sub-Project # 4: the International Cooperation and Capacity Building

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To contribute through training to capacity building in conservation sciences and techniques in the region	National capacities for conservation and utilization established and improved	FAO State of the World report FAO Commission and CBD COP reports	
Purpose Our purpose is to strengthen the NARS for conservation and utilization of Neotropical plant genetic resources	NARS germplasm collections conserved NARS scientists trained Networks strengthened	Visits to national GRUs Country questionnaires FAO/ IPGRI surveys	Sustained and appropriate funding NARS and networks willing and enabled to cooperate
Output 4.1 NARS human resources trained	Trainees trained in CIAT Courses at CIAT and in the region	Visits to training sites Research Theses	Cooperation of Regional Cooperation Office Participation of IPGRI
Output 4.2 Conferences in national/ international for a	Conferences held	Publication of proceedings	Interest of NARS
Output 4.3 Public awareness products	Public supportive to CIAT role in conservation	Press releases, TV emissions, press articles	Cooperation with CIAT Public Information Office
Output 4.4 Education and training materials	Universities, academia using training materials	Distribution/ sales of training materials	Cooperation of Regional Cooperation Office Participation of IPGRI

Sub-Project # 5: the Link with In situ Conservation on Farm and in the Wild

Narrative Summary	Measurable Indicators	Means of Verification	Important Assumptions
Goal To develop in situ methodologies for farmer landraces and wild relatives	Wider gene pools conserved in situ	List of taxa in protected areas	
Purpose Our purpose is to link the conservation of Designate Collections with on-farm conservation efforts and protected areas	Case studies and pilot in situ conservation projects	Contacts with Farmers' associations and Ministries of Environment	Sustained and appropriate funding International surveying possible Support in documentation delivered
Ouput 5.1. Project proposals prepared	Concept Notes distributed to potential donors	Concept Notes in Project/ Business Offices	Collaboration with CIAT Project Office
Output 5.2 Contribution made towards protected areas in Latin America	Wild relatives of CIAT crops included in protected areas	Publications	Interest by NARS and Conservation Agencies
Output 5.3 Practices on on-farm conservation documented	Participation of Farmers, NGOs and NARS in documentation of conservation practices	Publications Catalogs of landraces	Collaboration with CIAT GIS laboratory and regional projects

3.3. Financial Resources

Source	Amount (US$)	Proportion (%)
Unrestricted core	478,816	52
Carryover from 2004	28,693 (104,000)	3
Sub Total	**507,509**	
Special projects		
Enhancing forages MADR	70,430 (110,000)	7
Gene Flow BMZ	51,280	5
Palms MADR	21,315	2
Upgrading Plan Operations WB	285,242 (350,800)	31
Sub Total	**428,267**	
TOTAL	**935,776**	**100**

3.4. Research Highlights in 2005

Activity area # 1: the International Standards

The Upgrading of the CGIAR genebanks has progressed at full speed during 2005. A total of 10,404 accessions of beans and 5,274 accessions of tropical forages have been planted for seed increase and regeneration because of aging seeds. GRU is now operating four stations: Palmira (9.5 Ha), Quilichao (10.2 Ha), Popayán (1 Ha; 11 mesh-houses) and Tenerife (3,5 Ha), with 75 Staff. A total of 10,229 accessions have been harvested, processed and dried, while 2,444 accessions have been secured in the long-term vault. Viability has been tested for 4,834 seed accessions. To date, 11,695 seed accessions of beans and forages have been shipped to CIMMYT as safety back-up, while 1,184 accessions of cassava have been shipped to CIP (as slow-growth *in vitro*). The cassava core collection (630 accessions) is presently conserved in liquid nitrogen, as a test for a security back-up of the entire collection. Bar coding is now being extended to operations in the field (characterization, harvest), and the quality controls labs (viability and germplasm health).

Activity area # 2: the Germplasm and its data available

In 2005, GRU has distributed 7,790 samples of accessions out of the FAO designated collections for the three commodity crops (beans, cassava and tropical forages). This figure is slightly lower as compared to last year (8,274 samples of accessions), but continues to be on the high side as a clear indication of continuing interest into the FAO designated collections. It would be therefore quite justified to celebrate an agreement with the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture, at the moment of its first meeting (12-16 June 2006, Madrid). A new web site has been designed in order to facilitate consultations of GRU databases by internet users. To date, 21,676 digital images have been taken for seeds, cassava root sections, forage plants in the field, herbarium vouchers, in order to help internet users tailor down their germplasm requests. 83% of the entire cassava collection has been tested and certified against viruses of quarantine importance.

Activity area # 3: the Genetic and Social relevance of the Conservation

After hurricane Katrina devasted several areas of the Caribbean in August 2005, GRU has replied positively to the restoration of cassava clones to Cuba. Contacts have been made with REMERFI to restore farmers' seed stocks in areas of Guatemala, Honduras and Nicaragua affected by hurricane Stann. On the other hand, research has advanced in seed physiology of species of tropical fruits, namely *Passiflora* and *Carica*, as models of intermediate seed behaviour; this

research will help our partners to conserve poorly known species at lower costs and for longer durations. A study has been done in cooperation with Corpoica about extent of diversity and redundancy in the national collection of avocado of Colombia. In view of expanding the cassava collection in the future, while reducing costs of maintenance *in vitro*, a research has been undertaken to track down the duplicated accessions. At the request of MADR of Colombia, a protocol has been developed to successfully conserve seeds of the peach palm in liquid nitrogen, with possibility to apply it also to other palm species.

Activity area # 4: the International cooperation and capacity building
Three courses received input from GRU Staff in 2005. Nine publications were published in 2005. Thirteen lectures and presentations were made by Staff during this year. Two thesis research were supervised by GRU Staff and well concluded. Ten Professionals were given specialized training in GRU facilities. Five posters were presented in national/ international scientific congresses. One workshop was carried out with the network of botanical gardens of Colombia.

Activity area # 5: the Link with in situ Conservation on farm and in the wild
Phase 2 of the Gene Flow project supported by BMZ of Germany has started, along three perspectives. First, the methodology successfully developed to identify cases of gene flow in Costa Rica is now being applied to putative hybrid swarms identified in other countries (e.g. Guatemala, Colombia, Peru, Bolivia) between cultivated common bean and its wild form. Second, although very rare, there seems to be a few cases of introgression with the participation of a sister species belonging to the same evolutionary phylum as *P. vulgaris*. These natural interspecific hybrids were spotted in Colombia and in Costa Rica because of their morphology. Microsatellites screened at 68 loci generated banding patterns shared among all taxa (those of the same evolutive phylum), but also specific to each species and thus found in their putative hybrids. In both localities the natural crossing involves *P. dumosus* and *P. vulgaris*, but might result without effect given the lack of fertility of the natural hybrids. Third, in localities of Costa Rica where hybrid swarms have been identified in the past, and where agriculture has been abandoned, we continued to analyze subsequent generations of weedy forms in order to see whether past gene flow has any lasting effect.

This year we have collated information about the geographic distribution of wild bean populations in the following herbaria: BR, CR, CICY, ENCB, K, INB, M, SI and USJ. These data will help us to build up the pilot for the GEF project "Conservation and sustainable use of Neotropical wild relatives of crops through an integrated understanding of functional diversity".

3.5. Problems encountered and their solution

As indicated last year, for the upgrading of the facilities (e.g. new lighting system in the *in vitro* subculturing room, shelving system, alarms), problems in delivery on time and as per agreed terms have been faced with high frequency. Apart from contracting in the US or Germany (but possibly at higher costs), it is not clear what GRU can do, as these services are not often required on the Andean market. Imports (reagents for the lab, equipment for the Upgrading, official mail) from Miami have been noted with delays (frequency of delays, duration of delays). On the other hand, continuing reductions in the core (US$ 36,414 to operate in 2005!, the Upgrading Plan apart) raise doubts about operating the GRU without external special funding, and make planning difficult.

3.6. Plans for next year

- Continue to clear backlogs, namely that of the bean collection
- continue with regeneration of bean and tropical forage collections
- continue the shipments of the security back-ups to CIMMYT and CIP
- continue with the documentation of the 'institutional memory' by recovering elite germplasm released by CIAT and partners in the past in the countries
- update the web site, namely with evaluation and herbarium data
- expand the cryoconservation to a set of cassava clones beyond the core collection through vitrification technique
- continue Phase 2 of the Gene Flow Project
- publish in full results of Phase 1 of the Gene Flow Project, and of floral biology
- make appropriate follow-up to the pdf-B process for the GEF project
- prepare for the ratification of the International Treaty within SGRP (e.g. automatic documentation of MTAs)
- run international courses as it may be required (e.g. electronic distance education on *ex situ* conservation in Spanish 2nd version, and 1st version in English for Africa and Asia)

3.7. Executive summary

The Upgrading Plan of the CGIAR Genebanks ('Rehabilitation of International Public Goods', phase 1) has progressed at full speed in 2005. A total of 10,404 accessions of beans and 5,274 accessions of tropical forages have been planted for seed increase and regeneration because of aging seeds in four stations in Colombia. A total of 10,229 accessions have been harvested, processed and dried, while 2,333 accessions have been secured in the long-term vault. A 20% of the designate collections has been shipped to CIMMYT for the seed collections of beans and forages, and to CIP for the *in vitro* cassava collection, respectively, as safety back-ups. In 2005, GRU has distributed 8,480 samples of accessions out of the FAO designated collections for the three commodity crops. Research has advanced to get a better understanding of behaviour of seeds of *Passiflora* and *Carica* under different conservation conditions. A protocol has been successfully developed for the conservation of seeds of the peach palm in liquid nitrogen. Research has been carried out to identify the level of redundancy (i.e. genetic duplicate accessions) in collections of avocado and cassava, with help of AFLPs and SSRs markers, respectively. Three courses at national/ international level received input from GRU Staff in 2005. The special project on gene flow supported by BMZ of Germany has started its Phase 2, with emphasis on the participation of related species in the gene flow events, the ocurrence of gene flow over a large geographic range, and the persistence of its effects through time.

4. Project performance indicators

1.FLOWS, TECHNOLOGIES, METHODS & TOOLS

1.1. Backlogs cleared: 1,636 accessions cleared
1.2. Accessions regenerated: 4,550 of beans, 3,302 of tropical forages
1.3. Accessions secured in long-term : 2,333 accessions secured
1.4. Accessions in security back-up: Shipment this year 3,400 seed accessions (CIMMYT) and 1,184 *in vitro* accessions (CIP)

1.5. Accessions characterized 12,854 (field/ lab) + 6,640 (image bank)
1.6. Accessions distributed with passport data: 8,480 accessions distributed
1.7. Support Tools (software in germplasm management; databases available from internet) see www.ciat.cgiar.org
1.8. Data Bases united/ improved, same

2. PUBLICATIONS

2.1. Refereed Journals: published: 3

Chacón M.I., Pickersgill B. & D.G. Debouck. 2005. Domestication patterns in common bean (*Phaseolus vulgaris* L.) and the origin of the Mesoamerican and Andean cultivated races. Theor. Appl. Genet **110** (3): 432-444.

Ocampo, C. H., Martín, J. P., Sánchez-Yélamo, M. D., Ortiz, J. M. & O. Toro. 2005. Tracing the origin of Spanish common bean (*Phaseolus vulgaris* L.) cultivars using biochemical and molecular markers. Genet. Resources & Crop Evol. **52**: 33-40.

Torres González A.M. & C.M. Morton. 2005. Molecular and morphological phylogenetic analysis of *Brachiaria* and *Urochloa* (Poaceae). Molec. Phylogenet. Evol. **37**: 36-44.

2.2. Refereed Journals: submitted (accepted indeed): 2 (1 Crop Sci.; 1 NOVON)

Taxonomy of Tepary Bean (*Phaseolus acutifolius*) and Wild Relatives as Determined by Amplified Fragment Length Polymorphism (AFLP) Markers. L.C Muñoz, M.C Duque, D.G. Debouck & M.W. Blair. Crop Science **46**: *in press*.

Phaseolus novoleonensis, a new species (Leguminosae, Phaseolinae) from the Sierra Madre Oriental, Nuevo León, Mexico. J. Salcedo C., J. A. Arroyave, O. Toro Ch. & D. G. Debouck. NOVON **16:** *in press*.

2.3. Published Proceedings: published articles: 3

Balcázar, M.S., Rivera, Á. L. & Pineda L., B. 2005. Actividad antagónica de bacterias aisladas de semillas de *Brachiaria y* asociadas con hongos de *Brachiaria*. In: Memoria XLV Congreso annual de la Sociedad Americana de Fitopatologia Division Caribe, VI Congreso nacional de Fitopatologia y I Congreso Nacional de Fitoprotección. San José, Costa Rica, @7 Junio-1 De Julio de 2005. P. 89.
González-Torres, R.I., Araya-Villalobos R. & D.G. Debouck. 2005. Gene flow and its effect on biodiversity: common bean as model for future considerations of biosafety. Deutscher Tropentag 2005: The Global Food & Product Chain-Dynamics, Innovations, Conflicts, Strategies. October 11 – 13, 2005, University of Hohenheim, Stuttgart, Germany. p. 406.

Salcedo, J.M & D.G. Debouck. 2004. Comparación de areas en la region del estigma entre las formas silvestres y cultivadas (tradicionales y modernas) de *Phaseolus vulgaris* L. III Congreso Colombiano de Botánica. Noviembre 2004, Popayán, Colombia. p. 52.

2.4. Scientific Meeting Presentations: presentations: 13
2.5. Working Papers, Other Presentation or Publications: 3
(see under 6 in full report)

3. STRENGTHENING NARS
(see also under 6 in full report)

3.1.Training Courses : 3

3.2. Individualized Training : 10

3.3. PhD, MSc. and pregraduate thesis students: 2

4.0 RESOURCE MOBILIZATION

4.1 Proposals and concept notes submitted

- Sustainable utilization of the weregue palm in the Chocó of Colombia.
- Rehabilitation of International Public Goods: the Upgrading of CGIAR Genebanks, extension 2007-2009.
- Out-scaling of a multi-institutional e-learning venture on ex-situ conservation of plant genetic resources to Eastern African countries, together with E. Hess, for extension of distance education to African countries.

4.2. Ongoing special projects in 2005

Studies of gene flow in the bean model, Phase 2, supported by Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) of Germany, US$21,706 (to CIAT) and Euro21,330 (to University of Costa Rica).

Development of cryoconservation protocols for palm species, supported by Ministerio de Agricultura Tropical of Colombia, US$21,315.

Genebank Upgrading, supported by the World Bank, US$258,242.