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SB-01/02

Genetic Resources Unit

Report on Achievements and Progresses

CIAT
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CIAT GENETIC RESOURCES PRODUCT LINE: Options of agrobiodiversity available for agricultural development worldwide (2009-2011).

Targets	Products	Intended user	Outcome	Impact
PRODUCT 1	Genetic Resources Collections of CIAT Germplasm commodities upgraded and maintained up to international standards	All users of the three commodity germplasms worldwide, namely in Central and South America, Africa and South East Asia	Adoption or use designated germplasm in breeding/ agronomy programs	Better varieties, requiring less expensive inputs
Product Targets 2009	<ul style="list-style-type: none"> • 25% of bean backlog on introduction cleared • 25 % of designated accessions with increased characterization (recovery of 'institutional memory') • 50% of designated accessions documented with digital images • Bar coding implemented for all GRU operations • Protocols for conservation of botanic seeds of cassava and wild <i>Manihot</i> species defined • DNA bank: protocols and database established 	<ul style="list-style-type: none"> • NARS and CGIAR commodity breeding and research projects 	<ul style="list-style-type: none"> • Bean breeders can have access to a wider bean diversity • All breeders can use all past evaluation data by CIAT specialists 	<ul style="list-style-type: none"> • Designated germplasm accessed more quickly
Product Targets 2010	<ul style="list-style-type: none"> • 50% of bean backlog on introduction cleared • 50% of designated accessions with increased characterization (recovery of 'institutional memory') • Protocols for conservation of botanic seeds of cassava and wild <i>Manihot</i> species tested • Protocol for cleaned production of <i>Brachiaria</i> seed germplasm • DNA bank: 25% of in-trust bean and cassava accessions included 	<ul style="list-style-type: none"> • NARS and CGIAR commodity breeding and research projects 	<ul style="list-style-type: none"> • Bean breeders can have access to a wider bean diversity • All breeders can use all past evaluation data by CIAT specialists • NARS conserving <i>Manihot</i> genetic resources have an alternate conservation scheme • Forage agronomists can have access to <i>Brachiaria</i> germplasm • Geneticists can use DNA directly for beans and cassava 	<ul style="list-style-type: none"> • Designated germplasm can be used more efficiently by using the appropriate accession(s) • Gene responsible for a particular trait can be sequenced quickly • Gene maps better documented
Product Targets 2011	<ul style="list-style-type: none"> • 100% of bean backlog on introduction cleared • 75% of designated accessions with increased characterization (recovery of 'institutional memory') • Protocols for conservation of botanic seeds of cassava and wild <i>Manihot</i> species implemented • DNA bank: 50% of in-trust bean and cassava accessions included 	<ul style="list-style-type: none"> • NARS and CGIAR commodity breeding and research projects 	<ul style="list-style-type: none"> • Bean breeders can have access to a wider bean diversity • All breeders can use all past evaluation data by CIAT specialists • NARS conserving <i>Manihot</i> genetic resources have an alternate conservation scheme • Geneticists can use DNA directly for beans and cassava 	<ul style="list-style-type: none"> • Designated germplasm can be used more efficiently by using the appropriate accession(s) • Gene responsible for a particular trait can be sequenced quickly • Gene maps better documented

PRODUCT 2	The germplasm of <i>Phaseolus</i> beans, <i>Manihot</i> cassava and selected tropical forages is made available to users, restored to NARS, and safely duplicated	Users, including countries of origin, worldwide can obtain quality germplasm from CIAT GRU; that germplasm is systematically safely duplicated	The “Global System” foreseen by the Trust is getting concrete for beans, cassava, and tropical forages, and the NARS can rely on the CGIAR for a full backup of their national collections.	More benefits in the society (farmers, breeders, agronomists, but also university departments) because of access to genetic resources at anytime; stable and secure access because of the safety duplicates
Product Targets 2009	<ul style="list-style-type: none"> • On average 4-6,000 samples of the designated collections of beans, cassava and tropical forages are distributed to users annually • 3,000 accessions are replaced at CIP for the safety back-up of the cassava collection in vitro • 3,000 accessions are shipped to CIMMYT for the safety back-up of bean and tropical forages collections • 5,000 accessions are shipped to the Svalbard Global Seed Vault for the safety back-up of bean and tropical forages collections • Advances in detection of diseases of quarantine importance using the Real-Time PCR • Handling of SMTAs implemented electronically 	<ul style="list-style-type: none"> • CGIAR and NARS breeders sensu lato, NGOs, and farmers 	<ul style="list-style-type: none"> • Increased security for the in-trust collections • Shipment of in-trust germplasm and reporting to the Treaty Secretariat made easier • Multilateral System of the International Treaty is implemented and working for the in-trust collections kept by CIAT GRU 	<ul style="list-style-type: none"> • More sustainable food production through either improved varieties or traditional landraces restored to farmers
Product Targets 2010	<ul style="list-style-type: none"> • On average 4-6,000 samples of the designated collections of beans, cassava and tropical forages are distributed to users annually • 3,000 accessions are replaced at CIP for the safety back-up of the cassava collection in vitro • 3,000 accessions are shipped to CIMMYT for the safety back-up of bean and tropical forages collections • 5,000 accessions are prepared for shipping to the Svalbard Global Seed Vault for the safety back-up of bean and tropical forages collections • Methods for the detection of diseases of quarantine importance using the Real-Time PCR implemented 	<ul style="list-style-type: none"> • CGIAR and NARS breeders sensu lato, NGOs, and farmers 	<ul style="list-style-type: none"> • Increased security for the in-trust collections • Shipment of in-trust germplasm and reporting to the Treaty Secretariat made easier • Multilateral System of the International Treaty is implemented and working for the in-trust collections kept by CIAT GRU 	<ul style="list-style-type: none"> • More sustainable food production through either improved varieties or traditional landraces restored to farmers
Product Targets 2011	<ul style="list-style-type: none"> • On average 4-6,000 samples of the designated collections of beans, cassava and tropical forages are distributed to users annually • 3,000 accessions are replaced at CIP for the safety back-up of the cassava collection in vitro • 3,000 accessions are shipped to CIMMYT for the safety back-up of bean and tropical forages collections • 5,000 accessions are shipped to the Svalbard Global Seed Vault for the safety back-up of bean and tropical forages collections 	<ul style="list-style-type: none"> • CGIAR and NARS breeders sensu lato, NGOs, and farmers 	<ul style="list-style-type: none"> • Increased security for the in-trust collections • Shipment of in-trust germplasm and reporting to the Treaty Secretariat made easier • Multilateral System of the International Treaty is implemented and working for the in-trust collections kept by CIAT GRU 	<ul style="list-style-type: none"> • More sustainable food production through either improved varieties or traditional landraces restored to farmers

PRODUCT 3	The in-trust collections are genetically and socially relevant: GRU keeps the appropriate genetic diversity so that there is genetic progress in beans, cassava, and selected tropical forages.	Users worldwide can obtain the genetic variation they need in due time, now and in the future	Varieties of beans, cassava, and tropical forages that make a breakthrough in farmers' fields	Higher income for farmers, better nutrition for users, lower costs to the environment
Product Targets 2009	<ul style="list-style-type: none"> • Secondary gene pools of cultivated <i>Phaseolus</i> species better defined. • Monitoring of genetic erosion implemented so that germplasm explorations are carried out in due time and at the right place. • Selected explorations are taking place for <i>Phaseolus</i> and cassava germplasm in countries that have ratified the Treaty • Selected sets of germplasm are collected and restored to NARS/ farmers so that they can have access to niche markets (e.g. popping beans) 	<ul style="list-style-type: none"> • NARS, NGOs, farmer groups, breeders in AROs, other genebanks (e.g. USDA, EMBRAPA) are getting access to unexplored sources of variability 	<ul style="list-style-type: none"> • Breeders can include novel traits in their breeding programmes (e.g. white mold resistance in common bean breeding, delayed root deterioration in cassava breeding). 	<ul style="list-style-type: none"> • Increased production and incomes, improved nutritional and technological traits in the crop commodities at lower environmental costs.
Product Targets 2010	<ul style="list-style-type: none"> • Better appraisal of genetic relationships among <i>Manihot</i> species • Monitoring of genetic erosion implemented so that germplasm explorations are carried out in due time and at the right place. • Selected explorations are taking place for <i>Phaseolus</i> and cassava germplasm in countries that have ratified the Treaty • Selected sets of germplasm are collected and restored to NARS/ farmers so that they can have access to niche markets (e.g. popping beans, colored cassava) 	<ul style="list-style-type: none"> • NARS, NGOs, farmer groups, breeders in AROs, other genebanks (e.g. USDA, EMBRAPA) are getting access to unexplored sources of variability 	<ul style="list-style-type: none"> • Breeders can include novel traits in their breeding programmes (e.g. tolerance to extreme temperatures in common bean breeding, high or low HCN in cassava breeding). 	<ul style="list-style-type: none"> • Increased production and incomes, improved nutritional and technological traits in the crop commodities at lower environmental costs.
Product Targets 2011	<ul style="list-style-type: none"> • Selected explorations are taking place for <i>Phaseolus</i> and cassava germplasm in countries that have ratified the Treaty, or that allow access and registration into the Multilateral System of the Treaty • Selected sets of germplasm are collected and restored to NARS/ farmers so that they can have access to niche markets (e.g. popping beans, colored cassava) 	<ul style="list-style-type: none"> • NARS, NGOs, farmer groups, breeders in AROs, other genebanks (e.g. USDA, EMBRAPA) are getting access to unexplored sources of variability 	<ul style="list-style-type: none"> • Breeders can include novel traits in their breeding programmes (e.g. tolerance to extreme temperatures in common bean breeding, high or low HCN in cassava breeding). 	<ul style="list-style-type: none"> • Increased production and incomes, improved nutritional and technological traits in the crop commodities at lower environmental costs.

PRODUCT 4	Strengthened institutions that expand the scope of the conservation effort for the agricultural biological heritage	NARS in Latin America and Africa (primary target, although experience has shown that GRU training materials have been used by many other players, including Spain)	Improved capacity of NARS to tackle conservation problems of other sets of agrobiodiversity beyond the crop commodities handled by CIAT and the IARCs, namely along the two research drivers of GRU	More conservation for minor cereals, pulses, root crops and tropical fruit species, and hence diversification of the diet and of incomes for farmers worldwide
Product Targets 2009	<ul style="list-style-type: none"> Updated handbook of GRU procedures that can serve as a basis for future training (e.g. hands-on training, distance education through e-learning) Documents with best practices (joint activity involving several IARCs coordinated by SGRP) produced Distance education course re-run for Latin America (pending on funding availability) 	<ul style="list-style-type: none"> NARS, NGOs, departments of universities involved in conservation of agrobiodiversity 	<ul style="list-style-type: none"> Increased capacities of partner institutions to use the updated handbooks of procedures and booklets with best practices 	<ul style="list-style-type: none"> The “Global System” envisioned by the Trust is progressively taking place for other crops that the ones dealt with by the CGIAR, with conservation and social benefits
Product Targets 2010	<ul style="list-style-type: none"> Documents with best practices (joint activity involving several IARCs coordinated by SGRP) further diffused Distance education course run for Africa/ Asia (pending on funding availability) Participation of GRU Staff in MSc programmes including genetic resources conservation 	<ul style="list-style-type: none"> NARS, NGOs, departments of universities involved in conservation of agrobiodiversity 	<ul style="list-style-type: none"> Increased capacities of partner institutions to develop research in conservation for genetic resources not handled by IARCs 	<ul style="list-style-type: none"> The “Global System” envisioned by the Trust is progressively taking place for other crops that the ones dealt with by the CGIAR, with conservation and social benefits
Product Targets 2011	<ul style="list-style-type: none"> Distance education course run for Africa/ Asia (pending on funding availability) Participation of GRU Staff in MSc programmes including genetic resources conservation 	<ul style="list-style-type: none"> NARS, NGOs, departments of universities involved in conservation of agrobiodiversity 	<ul style="list-style-type: none"> Increased capacities of partner institutions to develop research in conservation for genetic resources not handled by IARCs 	<ul style="list-style-type: none"> The “Global System” envisioned by the Trust is progressively taking place for other crops that the ones dealt with by the CGIAR, with conservation and social benefits

PRODUCT 5	Improved link between conservation <i>ex situ</i> at CIAT with <i>in situ</i> conservation on farm and in the wild, resulting in larger numbers of populations of landraces and wild relatives effectively conserved	National genebanks (e.g. USDA, EMBRAPA); biodiversity institutes; major conservation agencies; national and international herbaria and museums of natural history; NGOs interested in on-farm conservation	Genetic resources of <i>Phaseolus</i> beans and <i>Manihot</i> cassava are better conserved, and hence used directly or employed in breeding programs	Improved conservation at lower costs for the societies; link between the environmental sector (i.e. protected areas) and the agricultural sector
Product Targets 2009	<ul style="list-style-type: none"> • Populations of <i>Phaseolus</i> beans documented in herbaria (two institutes not yet visited per year) • Populations of <i>Manihot</i> wild species documented in herbaria (two institutes not yet visited per year) • GIS mapping for at least one species of bean for all populations ever mentioned in the western hemisphere • Gene flow documented for beans/ or cassava in view of on-farm conservation 	<ul style="list-style-type: none"> • Genebanks of USDA, Mexico, Brazil; CONABIO of Mexico, INBio of Costa Rica, I von Humboldt of Colombia • NGOs interested in on-farm conservation of landraces 	<ul style="list-style-type: none"> • Natural history museums are integrated into genetic resources conservation for beans and cassava wild species • GIS capacity is put at work for the conservation of <i>Phaseolus</i> and <i>Manihot</i> species 	<ul style="list-style-type: none"> • More populations of more wild species of <i>Phaseolus</i> and <i>Manihot</i> eventually conserved; thus future sources of variability conserved for progress of plant breeding
Product Targets 2010	<ul style="list-style-type: none"> • Populations of <i>Phaseolus</i> beans documented in herbaria (two institutes not yet visited per year) • Populations of <i>Manihot</i> wild species documented in herbaria (two institutes not yet visited per year) • Matching all populations mapped versus those conserved <i>ex situ</i> in genebanks worldwide for that bean species; conclusions about conservation priorities • GIS mapping for another species of bean for all populations ever mentioned in the western hemisphere 	<ul style="list-style-type: none"> • Genebanks of USDA, Mexico, Brazil; CONABIO of Mexico, INBio of Costa Rica, I von Humboldt of Colombia • NGOs interested in on-farm conservation of landraces 	<ul style="list-style-type: none"> • Natural history museums are integrated into genetic resources conservation for beans and cassava wild species • GIS capacity is put at work for the conservation of <i>Phaseolus</i> and <i>Manihot</i> species 	<ul style="list-style-type: none"> • More populations of more wild species of <i>Phaseolus</i> and <i>Manihot</i> eventually conserved; thus future sources of variability conserved for progress of plant breeding
Product Targets 2011	<ul style="list-style-type: none"> • Populations of <i>Phaseolus</i> beans documented in herbaria (two institutes not yet visited per year) • Matching all populations mapped versus those conserved <i>ex situ</i> in genebanks worldwide for that second bean species; conclusions about conservation priorities • Populations of <i>Manihot</i> wild species documented in herbaria (two institutes not yet visited per year) 	<ul style="list-style-type: none"> • Genebanks of USDA, Mexico, Brazil; CONABIO of Mexico, INBio of Costa Rica, I von Humboldt of Colombia • NGOs interested in on-farm conservation of landraces 	<ul style="list-style-type: none"> • Natural history museums are integrated into genetic resources conservation for beans and cassava wild species • GIS capacity is put at work for the conservation of <i>Phaseolus</i> and <i>Manihot</i> species 	<ul style="list-style-type: none"> • More populations of more wild species of <i>Phaseolus</i> and <i>Manihot</i> eventually conserved; thus future sources of variability conserved for progress of plant breeding

1. 2008 PRODUCT LINE LOGFRAME.

Targets	Products	Intended user	Outcome	Impact
PRODUCT 1	Genetic Resources Collections of CIAT Germplasm commodities upgraded and maintained up to international standards	All users of the three commodity germplasms worldwide, namely in Central and South America, Africa and South East Asia	Adoption or use designated germplasm in breeding/ agronomy programs	Better varieties, requiring less expensive inputs
Product Targets 2008	<ul style="list-style-type: none"> • 50% of seed accessions under long-term at -20°C • 50% of seed accessions with viability tested • 50% of accessions with health tested • 50% of accessions regenerated • 25 % of designated accessions with increased characterization (recovery of 'institutional memory') • 30% of designated accessions documented with digital images • Bar coding implemented for operations in Germplasm Health • Protocols for conservation of botanic seeds of cassava and wild <i>Manihot</i> species defined • DNA bank: protocol advanced 	<ul style="list-style-type: none"> • NARS and CGIAR commodity breeding and research projects 	<ul style="list-style-type: none"> • Bean breeders can have access to a wider bean diversity • All breeders can use all past evaluation data by CIAT specialists 	<ul style="list-style-type: none"> • Designated germplasm accessed more quickly
PRODUCT 2	The germplasm of <i>Phaseolus</i> beans, <i>Manihot</i> cassava and selected tropical forages is made available to users, restored to NARS, and safely duplicated	Users, including countries of origin, worldwide can obtain quality germplasm from CIAT GRU; that germplasm is systematically safely duplicated	The "Global System" foreseen by the Trust is getting concrete for beans, cassava, and tropical forages, and the NARS can rely on the CGIAR for a full back-up of their national collections.	More benefits in the society (farmers, breeders, agronomists, but also university departments) because of access to genetic resources at anytime; stable and secure access because of the safety duplicates
Product Targets 2008	<ul style="list-style-type: none"> • On average 4-6,000 samples of the designated collections of beans, cassava and tropical forages are distributed to users annually • 2,800 accessions are replaced at CIP for the safety back-up of the cassava collection <i>in vitro</i> • 3,000 accessions are shipped to CIMMYT for the safety back-up of bean and tropical forages collections • 5,000 accessions are shipped to the Svalbard Global Seed Vault for the safety back-up of bean and tropical forages collections • Advances in detection of diseases of quarantine importance using the PCR reaction. • Handling of SMTAs implemented electronically 	<ul style="list-style-type: none"> • CGIAR and NARS breeders sensu lato, NGOs, and farmers 	<ul style="list-style-type: none"> • Increased security for the in-trust collections • Shipment of in-trust germplasm and reporting to the Treaty Secretariat made easier • Multilateral System of the International Treaty is implemented and working for the in-trust collections kept by CIAT GRU 	<ul style="list-style-type: none"> • More sustainable food production through either improved varieties or traditional landraces restored to farmers

PRODUCT 3	The in-trust collections are genetically and socially relevant: GRU keeps the appropriate genetic diversity so that there is genetic progress in beans, cassava, and selected tropical forages.	Users worldwide can obtain the genetic variation they need in due time, now and in the future	Varieties of beans, cassava, and tropical forages that make a breakthrough in farmers' fields	Higher income for farmers, better nutrition for users, lower costs to the environment
Product Targets 2008	<ul style="list-style-type: none"> Secondary gene pools of cultivated <i>Phaseolus</i> species and cassava better defined. Monitoring of genetic erosion implemented so that germplasm explorations are carried out in due time and at the right place. Selected explorations/ acquisitions are taking place for <i>Phaseolus</i> and cassava germplasm in countries that have ratified the Treaty. Selected sets of germplasm are collected and restored to NARS/ farmers so that they can have access to niche markets (e.g. popping beans) 	<ul style="list-style-type: none"> NARS, NGOs, farmer groups, breeders in AROs, other genebanks (e.g. USDA, EMBRAPA) are getting access to unexplored sources of variability 	<ul style="list-style-type: none"> Breeders can include novel traits in their breeding programmes (e.g. white mold resistance in common bean breeding, delayed root deterioration in cassava breeding). 	<ul style="list-style-type: none"> Increased production and incomes, improved nutritional and technological traits in the crop commodities at lower environmental costs.
PRODUCT 4	Strengthened institutions that expand the scope of the conservation effort for the agricultural biological heritage	NARS in Latin America and Africa (primary target, although experience has shown that GRU training materials have been used by many other players, including Spain)	Improved capacity of NARS to tackle conservation problems of other sets of agrobiodiversity beyond the crop commodities handled by CIAT and the IARCs, namely along the two research drivers of GRU	More conservation for minor cereals, pulses, root crops and tropical fruit species, and hence diversification of the diet and of incomes for farmers worldwide
Product Targets 2008	<ul style="list-style-type: none"> Updated handbook of GRU procedures that can serve as a basis for future training (e.g. hands-on training, distance education through e-learning) Documents with best practices (joint activity involving several IARCs coordinated by SGRP) produced Distance education course re-run for Latin America (pending on funding availability) 	<ul style="list-style-type: none"> NARS, NGOs, departments of universities involved in conservation of agrobiodiversity 	<ul style="list-style-type: none"> Increased capacities of partner institutions to use the updated handbooks of procedures and booklets with best practices 	<ul style="list-style-type: none"> The "Global System" envisioned by the Trust is progressively taking place for other crops that the ones dealt with by the CGIAR, with conservation and social benefits
PRODUCT 5	Improved link between conservation <i>ex situ</i> at CIAT with <i>in situ</i> conservation on farm and in the wild, resulting in larger numbers of populations of landraces and wild relatives effectively conserved	National genebanks (e.g. USDA, EMBRAPA); biodiversity institutes; major conservation agencies; national and international herbaria and museums of natural history; NGOs interested in on-farm conservation	Genetic resources of <i>Phaseolus</i> beans and <i>Manihot</i> cassava are better conserved, and hence used directly or employed in breeding programs	Improved conservation at lower costs for the societies; link between the environmental sector (i.e. protected areas) and the agricultural sector

2. List of 2008 Output Targets.

TARGETS 2008	Fully Achieved	75% Achieved	>50% Achieved	<50% Achieved	Cancelled	Deferred	VERIFICATION/ EXPLANATION
PRODUCT 1 (international standards)							Verification: GRU Annual Report 2008, and 2008 Report to the Trust.
50% of seed accessions under long-term at -20°C	X						51% of designated seed accessions in long-term at CIAT.
50% of seed accessions with viability tested	X						60% of designated seed accessions tested for viability.
50% of seed accessions with health tested	X						75% of designated accessions have been tested.
50% of seed accessions regenerated 50% of seed accessions regenerated	X						55% of forage accessions regenerated (91% in beans).
25% of seed accessions characterized	X						30% of seed accessions characterized.
30% of accessions with digital images	X						27,932 digital images available on the web site.
Bar coding implemented in Germplasm Health Lab	X						Bar coding pending in seed reception. Harvest of botanic seeds of different <i>Manihot</i> species in progress; reduction of area in Quilichao is a problem.
Protocols for conservation of botanic seeds of <i>Manihot</i> species	X			X			Protocol established for beans and cassava.
DNA bank protocol advanced							

PRODUCT 2 (GR distributed and safely replicated)							Verification: GRU Annual Report 2008, 2008 Report to the Trust, and GPG2 Report for 2008.
<ul style="list-style-type: none"> On average 4-6,000 samples of the designated collections of beans, cassava and tropical forages are distributed to users annually 	X						5,720 samples of beans, 332 samples of tropical forages, and 1,348 samples of cassava distributed to users in 2008.
<ul style="list-style-type: none"> 2,800 accessions are replaced at CIP for the safety back-up of the cassava collection <i>in vitro</i>. 	X						2,119 materials were sent to CIP, in reply to their evaluation, meaning that the slow-growth is working.
<ul style="list-style-type: none"> 3,000 accessions are shipped to CIMMYT for the safety back-up of bean and tropical forages collections. 	X						4,023 accessions (2,543 of beans and 1,480 of forages) were sent to CIMMYT in 2008.
<ul style="list-style-type: none"> 5,000 accessions are shipped to the Svalbard Global Seed Vault for the safety back-up of bean and tropical forages collections. 	X						30,911 accessions (21,698 of beans and 9,213 of forages) were sent to Svalbard in 2008; this work initiated in 1997 and went strong since 2003.
<ul style="list-style-type: none"> Advances in detection of diseases of quarantine importance using the CR reaction. 	X						A PCR detection test for Frog Skin Disease of cassava was published in 2008.
<ul style="list-style-type: none"> Handling of SMTAs implemented electronically. 	X						This has been implemented and has served as model for CIAT Breeding Projects.

PRODUCT 3 (Genetic relevance of designated collections)							Verification: GRU Annual Report 2008; http://www.ciat.cgiar.org/urg .
• Secondary gene pools of cultivated <i>Phaseolus</i> species and cassava better defined.	X						A phylogeny of 28 wild species of <i>Manihot</i> and 3 subspecies of cassava was published in 2008.
• Monitoring of genetic erosion implemented, so that germplasm explorations are carried out in due time and at the right place.						X	While CONABIO of Mexico got the data, they could not hire people this year.
• Selected explorations/ acquisitions are taking place for <i>Phaseolus</i> and cassava germplasm in countries that have ratified the Treaty.	X						140 accessions (landraces) introduced from Indonesia; introduction of 16 clones from high altitude location in Colombia.

PRODUCT 4 (Strengthened institutions)							Verification: GRU Annual Report 2008, GPG2 Report for 2008; http://www.ciat.cgiar.org/urg .
• Updated handbook of GRU procedures that can serve as a basis for future training (e.g. hands-on training, distance education through e-learning).	X						Handbook of procedures for <i>in vitro</i> and germplasm health on GRU web site.
• Documents with best practices (joint activity involving several IARCs coordinated by SGRP) produced.	X						Handbook of procedures for germplasm production and conservation in writing phase.
• Distance education course re-run for Latin America (pending on funding availability).	X						No course because of lack of funding, but 17 Professionals from Latin America, Nigeria, Spain, trained by individual training.

PRODUCT 5 (Improved link <i>ex situ/ in situ</i>)							Verification: GRU Annual Report 2008; 2008 Report to the Trust; http://www.ciat.cgiar.org/urg .
• Populations of <i>Phaseolus</i> beans documented in herbaria (two institutes not yet visited per year).	X						In 2008, the following herbaria were studied: CAS, CS, DAV, FI, IBUG, IEB, O and TEX.
• GIS mapping for at least one species of bean for all populations ever mentioned in the western hemisphere.	X						Done for the <i>Brevilegumeni</i> for Costa Rica for the publication of a new species
• Gene flow documented for beans/ or cassava in view of on-farm conservation.		X					Done for two groups of Lima beans from Mexico and Peru, respectively, in view of a future publication.

3. Research Highlights 2008

A published result has been the definition of a PCR protocol for the detection of Frog Skin Disease in cassava. This viral disease endemic in all countries of Amazonia can harm cassava production very much, with no symptoms expressed on the aerial part in most cases but no root. The regular testing by grafting a hypersensitive clone on the rootstock to be tested takes 13 months, although a minigrafting improved by GRU in the past takes 21 weeks. With the rt-PCR test, the result is obtained in 5 days. The parallel testing grafting and PCR performed on 508 clones from 21 countries has shown an excellent correlation, with a plus for the rt-PCR in sensitiveness of detection. Apart from applications in cassava research, this protocol is very useful in germplasm movement, because it can be done on *in vitro* materials, thus at the very beginning of any introduction process. It is also very safe for tropical countries where introduction of the viral disease is feared.

DNA sequencing on two cpDNA intergenic spacers (*trnL-trnF* and *atpB-rbcL*) and the ITS/5.8S region was performed to investigate the genetic relationships among wild and domesticated Lima beans. The Neighbor-Joining topologies built on the bases of cpDNA and ITS/5.8S polymorphisms reveal three gene pools in this crop, while only two have long been recognized by many authors. One gene pool called 'AI' with wild forms from SW Ecuador and NW Peru and large-seeded cultivated forms from the same region, confirms the domestication of the latter from the former. A second gene pool called 'MI' includes mostly wild forms from Mexico west of Tehuantepec and small-seeded domesticated forms from the same region and from Central America and South America, evidencing a possible domestication west of Tehuantepec in Mexico. A third gene pool called 'MII' includes mostly wild forms from Mexico east of Tehuantepec, different countries of Central America, Cuba, Colombia, eastern Peru, and Argentina, and two small-seeded domesticated accessions from Brazil, opening up the possibility of a third domestication event, the precise location of which now depends on further exploration of this gene pool.

4. Project Outcome

Safety backup of CIAT designated seed collections (beans and tropical forages) into the Svalbard Global Seed Vault, resulting in a worldwide recognition of the role of the CGIAR in saving agricultural biodiversity.

It is wise practice in genebanks to deposit copies of genetic collections as safety backups, in appropriate facilities (Product 2 of GRU Product Line); making safety backups was listed in MTP 2004-2006 and MTP 2006-2008 (it was also a priority within the GPG1 and GPG2 collective efforts of Upgrading the CGIAR genebanks, supported by the World Bank). It is responsible practice when as in the case of CIAT the agricultural heritage of 141 countries is kept in trust. For filling such objectives, it was necessary to produce all that seed, clean it, check viability and health status, and then pack according to the highest quality standards. On December 19, 2007, CIAT made an agreement with the Ministry of Agriculture and Food of Norway to deposit a copy of the seed collections of beans (35,896 accessions to date) and tropical forages (23,140 accessions) into the Svalbard Global Seed Vault. Two shipments (30,911 on Jan 30, 2008, and 3,200 on Feb 9, 2009) have been made to date, securing a total of 34,111 accessions (23,812 of beans and 10,299 of forages). CIAT was third in the number of accessions deposited among the first twenty depositors

on the Opening of the Vault (the first two depositors: IRRI with 70,180, CIMMYT with 57,721, and CIAT with 30,911), on February 26, 2008. The contribution by CIAT was key for filling the CGIAR target of 200,000 accessions at Svalbard for the Opening, as agreed with the Global Crop Diversity Trust that sponsored the initiative. It was an interesting and unmatched case of cooperation, from near the equator to the arctic polar circle, involving the Centers in places as distant as Palmira, Los Baños, Texcoco, Aleppo, Ibadan, Lima, Addis, the secretariat of the Trust in Rome, and the Nordic genebank in Oslo and in Longyearbyen.

The outcome was three-fold: an increased security for the in-trust collections, a responsible implementation of the agreement of 16 October 2006 between CIAT and the Governing Body of the International Treaty, and a worldwide recognition of the role of the CGIAR in saving agricultural biodiversity for present and future generations. During the opening and afterwards, there were over 100 articles (in journals such as Time, the New York Times, International Herald Tribune, US News, The Guardian, Science, Popular Science), press releases, interviews covering the work of CIAT and sister Centers towards that goal. A compilation of many of the press articles, specially in Latin American countries, can be found in <http://www.ciat.cgiar.org/urg>, then GRU Files (“CIAT at Svalbard: a report”). The visibility of the CGIAR towards the world media was second to that when Dr Borlaug won the Nobel prize. The Vault was evaluated as the 6th Best Inventions of the Year 2008 by Time Magazine of November 10, 2008, and without the seeds from the CGIAR, there would have been no start of a functional Vault in Svalbard. Beyond the technical aspects, and as stressed by Mr Stoltenberg of Norway and Mr Barroso of EU, a lasting impact of the Vault and the seeds therein is the message to the world community that our survival depends on conservation.

5. A list of 2008 publications

5.1. Articles in refereed journals

Calvert, L.A., **M. Cuervo**, I. Lozano, N. Villareal & J. Arroyave. 2008. Identification of three strains of a virus associated with cassava plants affected by frogskin disease. *J. Phytopathology* **156**: 647-653.

Chacón, J., S. Madriñán, **D.G. Debouck**, F. Rodríguez & J. Tohme. 2008. Phylogenetic patterns in the genus *Manihot* (Euphorbiaceae) inferred from analyses of nuclear and chloroplast regions. *Molec. Phylogen. Evol.* **49** (1): 260-267.

Gaiji, S. & **D.G. Debouck**. 2008. Flujos de germoplasma en las Américas: 30 años de distribución de muestras de frijol por parte del Centro Internacional de Agricultura Tropical. *Recursos Naturales y Ambiente* **53**: 54-61.

Montoya, C.A., P. Leterme, N.F. Victoria, **O. Toro**, W.B. Souffrant, S. Beebe & J.-P. Lallès. 2008. Susceptibility of phaseolin to *in vitro* proteolysis is highly variable across common bean varieties (*Phaseolus vulgaris*). *J. Agric. Food Chem.* **56**: 2183-2191.

Reichel, H., **Cuervo, M.** & F. Morales. 2008. Caracterización parcial de un potexvirus aislado de *Musa coccinea* afectada por rayado neurótico en Colombia. *Agronomía Colombiana* **26** (2): 285-291.

5.2. Articles in non-refereed journals

D.G. Debouck, R. Herrera T. & R. Araya V. 2008. New populations of wild common bean disclosed in Nicaragua. Annu. Rept. Bean Improvement Coop. (USA) **51**: 120-121.

Ocampo, C. H. & O. Toro. 2008. Phaseolin diversity of Nicaraguan common bean germplasm held at CIAT. Annu. Rept. Bean Improvement Coop. (USA) **51**: 122-123

5.3. Papers presented at formal conferences and workshops with external attendance

Aranzales, E. Lima, Perú, 22-23 November 2008, invited REDARFIT meeting: "Conservación *in vitro* de germoplasma del género *Manihot*."

Aranzales, E. Palmira, Colombia, 30 October 2008, invited Universidad Nacional de Colombia: "Aplicaciones prácticas de las técnicas de cultivo de tejidos vegetales."

Cuervo, M., Lozano, I., and Morales, F. Palmira, Colombia, 26 November 2008, invited internal seminar in CIAT: "Historia, caracterización y manejo de la enfermedad viral más importante de la especie *Manihot esculenta* en su centro de origen."

Debouck, D.G. Palmira, Colombia, 3 December 2008, invited internal seminar in CIAT: "1,2,3: a new strategic look at a great crop."

Debouck, D.G. Davis, California, USA, 15 September 2008, invited conference at the Harlan II Symposium on the domestication of crop plants and domestic animals: "Domestication of Lima beans: a new look at an old problem."

Debouck, D.G. Celaya, México, 22 May 2008, invited conference at the 1st international bean congress: "Recursos genéticos y patentes: el caso del fríjol común."

Debouck, D.G. Quito, Ecuador, 9 May 2008, invited seminar at the regional workshop of IUCN on certificate of origin: "Perspectivas desde un Centro Internacional sobre la Trazabilidad."

Debouck, D.G. Lima, Perú, 6 May 2008, invited conference at the 13th Latinamerican Congress of Genetics: "Experiencias con los Recursos Fitogenéticos de Fríjol y Yuca."

Debouck, D.G. Palmira, Colombia, 7 March 2008, invited internal seminar in CIAT: "Implications of the International Treaty on Plant Genetic Resources for Food and Agriculture for the work of the Center."

Toro, J.O. 2008. Banco Mundial de *Phaseolus* spp. L., CIAT – URG, Aspectos relevantes en regeneración. Presentación en Power point (PDF), REDARFIT 22-23 de Noviembre, Lima, Perú.

5.4. Posters

Balcázar, M.S.; Rivera, A.L.; Pineda L., B. 2008. Preliminary results of *in vitro* antagonist bacteria on development of fungi isolated from *brachiaria brizantha* seeds. 2nd International Symposium on Biological Control of Bacterial Plant Diseases, Orlando, FL, USA, 4-7 November 2008.

Motta-Aldana, J.R.; Serrano-Serrano, M.L.; Hernández Torres, J.; Castillo-Villamizar, G.; **Debouck, D.G.;** Chacón S., M.I. 2008. Domestication patterns in wild Lima bean (*Phaseolus lunatus* L.) from the Americas. International Symposium Harlan II, University of California, Davis, CA, USA, 14-18 September 2008.

Serrano-Serrano, M.L.; Hernández Torres, J.; Castillo-Villamizar, G.; **Debouck, D.G.;** Chacón S., M.I. 2008. Gene pools in wild Lima bean (*Phaseolus lunatus* L.) and their origin. International Symposium Harlan II, University of California, Davis, CA, USA, 14-18 September 2008

Mafla, G.; Roa, J.C.; Flor, N.C.; **Aranzales, E.;** Moreno, M.G.; **Cuervo, M.;** **Debouck, D.G.** 2008. Distribution of cassava germplasm from an international genebank: a service to the global agriculture. Scientific Meeting of GCP21, Ghent, Belgium, 21-25 July 2008.

Sánchez, T.; Ceballos, H.; Dufour, D.; **Mafla, G.;** Calle, F.; **Debouck, D.;** Pérez, J.C.; Morante, N.; Tohme, J. Variation in starch and root quality traits in cassava. Cassava Meeting the Challenges of the new millennium, Ghent, Belgium, July 21-25 2008.

Calle, F.; Lenis, J.I.; Pérez, J.C.; **Mafla, G.;** **Debouck, D.;** Ceballos, H.; Tohme, J.; Morante, N. Multilocation evaluation of the cassava core collection from CIAT. Cassava Meeting the Challenges of the new millennium. July 21-25, Ghent, Belgium, 2008.

Martínez, J.; **Urquijo, E.;** Caldas, A.; **Debouck, D.G.** 2008. Capacitación y difusión de resultados de la Unidad de Recursos Genéticos. 30th Anniversary of CIAT GRU, Palmira, Colombia, 18 June 2008.

Lima, M.C.; **Ciprián, A.;** **Toro, O.;** **Debouck, D.G.** 2008. Distribution of bean and tropical forage germplasm from an international genebank: a service to the global agriculture. 30th Anniversary of CIAT GRU, Palmira, Colombia, 18 June 2008.

Lima, M.C.; **Ciprián, A.;** **Toro, O.;** **Debouck, D.G.** 2008. Distribución de germoplasma de frijoles y forrajes tropicales desde un banco de germoplasma internacional como un servicio a la agricultura global. 30th Anniversary of CIAT GRU, Palmira, Colombia, 18 June 2008.

Lima, M.C.; **Ciprián, A.;** **Toro, O.;** **Debouck, D.G.** 2008. La colección del CIAT en el Depósito Global de Semillas de Svalbard. 30 Aniversario de CIAT URG, Palmira, Colombia, 18 June 2008.

Mafla, G.; Roa, J.C.; Flor, N.C.; **Aranzales, E.;** Moreno, M.G.; **Cuervo, M.;** **Debouck, D.G.** 2008. Distribución de germoplasma de yuca desde un banco de genes internacional: un servicio a la agricultura mundial. 30 Aniversario de CIAT URG, Palmira, Colombia, 18 June 2008.

Mafla, G.; Roa, J.C.; Flor, N.C.; **Aranzales, E.;** Moreno, M.G.; **Cuervo, M.;** **Debouck, D.G.** 2008. Distribution of cassava germplasm from an international genebank: a service to the global agriculture. 30th Anniversary of CIAT GRU, Palmira, Colombia, 18 June 2008.

Debouck, D.G. 2008. La solicitud de revisión de la patente sobre el frijol Amarillo 'Enola'. 30 Aniversario de CIAT URG, Palmira, Colombia, 18 June 2008.

6. List of proposals funded in 2008, should be prepared, including total dollar value of each contract and donor, and the amount going directly to CIAT for implementation.

Project	Title	Acronym	Donor	Starting Date	Ending Date	Outcome Line	Total Budget	CIAT Budget
GRA52	The Long-Term conservation and sustainable utilization of the ex situ collection of Bean and Cassava germplasm held by CIAT	GCDT	The Global Crop Diversity Trust.	1-Jan-08	31-Dec-12	SBA-5	120,000	120,000
GRA50	The Long-Term conservation and sustainable utilization of the ex situ collection of Bean and Cassava germplasm held by CIAT	GCDT	The Global Crop Diversity Trust.	1-Jan-08	31-Dec-12	SBA-5	150,000	150,000
GRG57	Development and refinement of cryopreservation protocols for the long-term conservation on vegetatively propagated crops	GCDT	The Global Crop Diversity Trust.	15-Jul-08	30-Sep-09	SBA-5	37,950	37,950
CPA70	Industrial Uses of Cassava-Waxy Starch	TTDI	Thailand Tapioca Development Institute.	01-Jan-08	31-Dic-12	SBA-2	62,501	62,501
GRC3	Rehabilitation of International Public Goods; CGIAR Genebanks Upgrading Project, Global Public Goods, Phase 2).	WB	World Bank	01-Jan-08	31-Dec-08	SBA-5	208,010	208,010

7. Staff list: (indicate % time assignment)

Daniel G. Debouck, Head, PhD (100%)
 Celia Lima, Agr. Engineer, M.Sc. (100%)
 Graciela Mafla, Biologist (100%)
 Maritza Cuervo, Agr. Engineer, M.Sc. (100%)
 César Ocampo, Biologist, M.Sc. (100%)
 Orlando Toro, Technician (100%)
 Arsenio Ciprián, Technician (100%)
 Roosevelt Escobar, Biologist, M.Sc. (50%)
 Ericson Aranzales, Ing. Biotec. (100%)
 Maria del Socorro Balcázar, Bacteriologist (100%)
 Ángela Marcela Hernández, Information System Analyst (100%)
 Josefina Martínez, Secretary (100%)
 Eliana Urquijo, Secretary (100%)

8. Summary budget prepared by Finances:

Source	Amount (US\$)	Proportion (%)
Unrestricted core	721,659	58.6
Sub Total	721,659	
<i>Special projects</i>		
Long-Term conservation-Cassava	120,000	9.7
Long-Term conservation-Beans	150,000	12.2
Development and refinement of cryoconservation	14,000	1.1
Upgrading Plan Operations 2	208,010	16.9
Cassava genetic resources (TTDI)	16,667	1.3
Sub Total	508,677	
TOTAL	1,230,336	100.0