Generation Challenge Programme
CGIAR Challenge Programme Annual Report 2006

Submitted by
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Generation Challenge Programme
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Contents

Acronyms and abbreviations

ABA	abcissic acid
ADOC	allelic diversity for orthologous candidate genes
Al	aluminium
ARIs	advanced research institute
ARM	Annual Research Meeting
ASR	ABA-stress-ripening
BAC	bacteria artificial chromosome
BC1F1	backcross 1 hybrid of first generation
BecA	Biosciences Eastern and Central Africa
cDNA	complementary DNA
CGIAR	Consultative Group on International Agricultural Research
CGIAR	Consultative Group on International Agricultural Research
CP	Challenge Programme
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
CSO	civil society organisation
CSS	chromosome segment substitution
DFID	Department for International Development (UK)
DPKit	Delivery Plan Kit
EC	European Commission
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuària (Brazilian Agricultural Research Corporation)
EPMR	External Programme and Management Review
EST	expressed sequence tag
ETR	External Target Review
FSTs	flanking sequence tags
GCP	Generation Challenge Programme
GFAR	Global Forum for Agricultural Research
GSS	Genotyping Support Service
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IITA	International Institute of Tropical Agriculture
IP	intellectual property
LIMS	Laboratory Information Management System
MAB	marker-assisted backcrossing
MT	Management Team
NARS	national agricultural research system
NGO	non-governmental organisation
NILs	near-isogenic lines
P	phosphorous
PAC	Programme Advisory Committee
PI	Principal Investigator

PSC	Programme Steering Committee
Pup1	phosphorus-uptake 1
QTL	quantitative trait loci
RAP	Review and Advisory Panel
SHC	Stakeholders Committee
SNP	single nucleotide polymorphism
SP	Subprogramme
SPL	Subprogramme Leader
SSR	simple sequence repeat
ABA	abcissic acid
ADOC	allelic diversity for orthologous candidate genes
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SP	Subprogramme
SPL	Subprogramme Leader
SSR	simple sequence repeat

1. Executive Summary

The year 2006 has been a year marked with many changes and successes for the Generation Challenge Programme (GCP).

GCP is a broad network of partners collectively working to improve access by researchers in the developing world to crop diversity and new technologies: we develop and promote the use of new breeding tools that can make their work faster and more efficient. One of GCP's main objectives is to link 'basic' research with 'applied' science, to ensure scientific innovations and technologies are relevant to, and improve, crop breeding in marginal drought-prone environments.

Staying steadfast to this purpose, GCP generated a wide variety of products in 2006, including reference samples for GCP crops; characterised genes of high importance for plant performance under stress; analytical tools for data evaluation; molecular markers for genetic studies and breeding experiments; value-added germplasm; and training materials for scientists. Generating quality products for use by partners along the delivery chain is of critical importance to GCP: the success of the Programme will be judged by the quality of its science and the ability of its products to improve crop breeding.

GCP put out the second competitive call in 2006. The first step was for the Management Team to identify thematic areas prioritised by GCP for short-term development. The thematic calls provide more depth and focus. In addition, they enhance consolidation and complement our research agenda.

The Management Team produced a Strategic Framework to guide GCP's work in the coming years. The framework was approved by the PSC in November 2006. This Strategic Framework is a set of guiding principles for strategic decision-making and will be complemented by 'reference studies' that will provide data on GCP's impact targets.

As GCP matures and generates more and more products, capacity-building, product management and product delivery are also evolving and increasingly coming to the foreground. GCP's new strategy requires that all new project designs have a clear product delivery plan.

Staff and management composition were also changed in 2006, and two Subprogramme Leader (SP3 and SP5) positions were converted from half-time to full-time positions. The changes were necessitated by our growing portfolio of projects, which now number about 70. The SP3 Leader position now includes a product management function, complementing the SP5 Leader's Product Delivery role.

In 2005, GCP's Programme Steering Committee (PSC) established a Task Force on Governance Structure to review GCP's governance. The Task Force developed a set of options and recommendations for reform, which were presented during the 2006 PSC meeting, and the work of the Task Force is ongoing.

On the financial front, GCP has maintained a healthy financial position, thanks in large measure to support from committed funders. Our major funders are the EC, the UK's Department for International Development (DFID) and the World Bank—in 2006, they jointly contributed about 90 percent of our total income. The Rockefeller Foundation, the Swiss Agency for Development and Cooperation and the Swedish International Development Cooperation Agency also support GCP.

Looking back on 2006 and years past, we are confident that GCP is on the right track to achieve its mission of producing better crop varieties for resource-poor farmers.

2. Background

The Generation Challenge Programme (GCP) was launched in July 2003 following approval by the Executive Council of the Consultative Group on International Agricultural Research (CGIAR). Designed as a two-phase 10-year initiative, GCP is now approaching the end of Phase I, which runs from 2004–2008, while Phase II will be 2009–2013.

2.1 Programme objectives and structure

The mission of the Generation Challenge Programme is to serve as a research and capacity-building network that uses plant genetic diversity, advanced genomic science, and comparative biology to develop tools and technologies that enable plant breeders in the developing world to produce better crop varieties for resource-poor farmers. In line with this mission, by 2013, GCP is expected to contribute to the following objectives:

- Provide access to, and promote the use of, genetic diversity in plant improvement programmes.
- Develop a public platform of genetic and genomic resources and tools, and support a global community that can use them.
- Generate and apply knowledge across crops, and demonstrate the potential of comparative genomics to impact plant improvement programmes.
- Use genetic diversity and advanced science to develop products for plant breeding programmes to improve the livelihoods of resource-poor farmers in marginal, drought-prone environments.

A major objective for GCP is to help link 'basic' research with 'applied' science—to help make scientific innovations and new technologies relevant for resource-poor farmers, and to improve access by scientists and researchers in the developing world to technologies that can make plant breeding faster and more efficient.

GCP was also assigned a trait of focus: drought tolerance, which affects almost all crops and all regions worldwide, thereby providing opportunities to apply useful discoveries across crops. To achieve its research agenda, generate and add value to its products and ensure their delivery, GCP is organised into five Subprogrammes (SPs), which span the spectrum of research and development from germplasm, genomics and bioinformatics to molecular breeding for agricultural development.

2.2 Research strategy and priorities

GCP's first two years were devoted to establishing and implementing our operational structure and research portfolio. During the third year, the GCP Management Team (MT) (comprising the Director and the five Subprogramme Leaders) was of the view that a strategic framework[1] outlining GCP's internal reflections on its mission, structure, research approach and resource allocation would be useful at this point in GCP's development, in keeping with our ultimate goal of ensuring our products impact crop

[1] *Generation Challenge Programme Strategic Framework*. February 2007 http://www.generationcp.org/comm/gcp_framework_final.pdf

breeding for the benefit of resource-poor farmers. The strategic framework is a set of guiding principles for strategic decision-making and helps identify, and further clarify, important issues in the large and complex task assigned to GCP. The strategy is complemented by 'reference studies' (such as the one by Glenn Hyman et al[2]) that provide data on GCP's impact targets (in terms of crops and regions). Those data are key for informed decisions and strategy implementation.

A strategy is only of value if it is implemented and in this regard, 2007 is a watershed year for GCP. Our new project portfolio is defined by several key elements of our strategy: better integration of activities across Subprogrammes 1, 2 and 3, more focus on key strategic crops and target regions for SP3 projects, promotion and utilisation of the first GCP products (e.g. Genotyping Support Service), better integration of breeders in GCP projects and an increasing leadership role by scientists from national programmes, thus ensuring 'downstream' projects are demand-driven.

GCP's research framework is unique, composed of three main complementary funding mechanisms—competitive grants, commissioned research projects and special projects. These three mechanisms are well-suited to our agile funding system and also guarantee that GCP's research portfolio is fine-tuned to the latest developments in the dynamic research-for-development world in which GCP operates.

Now that GCP is fully operational, we are currently refining the notion of 'products' in the context of GCP and how best to manage them to ensure we promote and deliver them efficiently to users.

[2] Poster summarising this study available at:
http://www.generationcp.org/comm/drought_poverty_poster.jpg

3. Research accomplishments

3.1 Overview

2006 is GCP's third year, marked by remarkable scientific progress demonstrating that the GCP is fully operational.

In all, GCP had nearly 70 projects by the end of 2006, generating numerous relevant outputs of interest to the scientific and development communities. The 17 competitive projects that began in January 2005 have now completed their second year and are approaching their final year. These projects contribute to enhancing the efficiency, speed and scope of plant breeding in marginal environments, as was evidenced by presentations in the 2006 Annual Research Meeting. Among others, we can report the cloning of the gene that confers tolerance to aluminum toxicity in sorghum, which laid the foundation for cloning other tolerance genes in cereals. Considerable progress is also being made towards cloning the rice genes that control tolerance to salinity and phosphorus-deficient soils. Several segregating plant materials for drought tolerance have been developed, including substitution lines in rice. There has been major progress in understanding the genetic basis for drought tolerance in cereals, identifying several drought candidate genes. A fresh call for competitive grants went out in 2006, resulting in six new large projects to be initiated in mid-2007.

Several new commissioned projects were initiated in 2006, in addition to the ongoing ones from 2005. Commissioned projects complement competitive projects and are designed to add value to the range of genetic and genomic resources publicly available through GCP. Commissioned projects add value by addressing a specific need, or by collating outputs from research projects. Commissioned projects also test proofs of concept relevant to GCP's research strategy.

A major achievement at the end of 2006 was the characterisation of composite sets with molecular markers for rice, maize, wheat, sorghum, chickpea, potato, groundnut and coconut, with final range of data coverage from 70 to over 100 percent. The ADOC initiative (Allelic Diversity for Orthologous Candidate genes) focuses on the characterisation of key genes involved in drought tolerance, to rapidly transpose the most recent results in a plant species to several other GCP crops. In 2006, several institutions contributed to a GCP database on allelic diversity on key drought genes across GCP crops. A new set of commissioned projects targets the validation of molecular markers in adapted germplasm under local marginal environments. As described below, commissioned activities are also critical to develop suitable infrastructure and analytical tools for data storage, analysis and exchange as well as for capacity-building and delivery.

3.2 Technical outputs

GCP's research accomplishments in 2006 are as follows:

- New representative samples finalised for six crops and new simple sequence repeat (SSR) markers identified for 10 crops for use in large-scale genotyping

- Targeted genotyping for candidate genes: 79 drought-related maize genes studied for screening 350 inbred lines
- Universal Core Genetic Map for rice developed and advances made in chromosome segment substitution and backcrossing with wild relatives for ten populations
- Drought phenotyping network strengthened and a community of practice established for less-studied and slow-to-breed crops such as potato, cassava, *Musa* and coconut
- New expressed sequence tag (EST) for pearl millet and cowpea, more genomic resources generated for *Musa,* and contribution to the production of SNP data across the genomes of 20 rice lines
- Transcriptome analysis to bridge the gene–phenotype gap for efficient identification of candidate genes responsible for target traits
- Gene for Al tolerance sorghum identified; 288 maize lines phenotyped for Al tolerance and six genes found associated with maize Al tolerance
- Gene for P-deficiency tolerance (*Pup1)* fine-mapped to within 300 kb (kilobase)
- Twelve gene-specific markers diagnositic of *Pup1*and 25 candidate genes identified
- Phenotyping approaches and protocols improved and a publication under development
- Support-systems for marker-assisted selection developed to convert gene-based knowledge into robust molecular breeding approaches
- Molecular breeding systems pilot-tested with simply inherited traits
- Markers for virus resistance in cassava and *Striga* resistance in cowpea available for generating more resistant germplasm
- Low-cost, high-throughput markers developed for maize grain quality, and for bacterial blight resistance in rice, providing essential methodological insights for routine, large-scale marker conversion
- Experience and technologies transferred to less-studied crops: wide crosses and molecular marker analysis leading to a new paradigm in groundnut breeding based on successful use of synthetics in breeding of other complex polyploid crops (e.g., wheat and canola)
- GCP Central Registry and GCP data templates established and data uploaded for public download
- ICRISAT's Laboratory Information Management System (LIMS) installed at BecA and IITA–Ibadan
- iMAS software to aid marker-assisted breeding released for testing in 2007

3.3 Summary of 2006 research outputs

A fairly large and diverse set of tools and products has been generated this year including reference samples for most GCP mandate crops; characterised genes of high importance for plant performance under non-optimal conditions; analytical tools for evaluating data; molecular markers for genetic studies and breeding experiments; value-added germplasm; and training materials for scientists. This list is obviously not exhaustive and major research outputs for 2006 are presented below by Subprogramme (for more details, see the GCP 2006 annual report).

3.3.1 SP1 Genetic diversity of global genetic resources

The analysis of germplasm structure has progressed remarkably for most of the GCP crops. New representative samples were finalised for six crops and new SSR markers identified for ten crops for use in large-scale genotyping. The SSR genotyping effort per se has been completed for several crops, providing a definite basis for identifying reference samples. Massive data for maize, wheat, chickpea, potato and coconut have been deposited in the GCP Registry. A drought phenotyping network was strengthened by integrating modelling approaches with EMBRAPA in an interdisciplinary effort. A more general inventory of capacities has begun. The understanding of linkage disequilibrium has progressed for rice and sorghum. A community of practice has emerged for less advanced and slow-to-breed crops such as potato, cassava, *Musa* and coconut. A pilot project on rice refined interspecific introgression population panels between Asian and African cultivated rice and further developed interspecific backcrosses with various wild species. Altogether, this should facilitate association studies in various populations.

3.3.2 SP2 Comparative genomics for gene discovery

For the first time in 2006, mutant populations (thought still in early generations) of bean and potato mutant stocks were produced, representing unique genetic resources resulting from GCP investment. The genomic resource base of *Musa* has been expanded, a step leading to the generation of a *Musa*-rice syntenic map. Results from several experiments on transcriptome analysis of stress (disease and drought) response have provided a genome-wide view of genetic regulation of stress tolerance. A bioinformatics pipeline and computing infrastructure provided by SP4 have enabled the identification of gene sets that are relevant to realistic physiological and phenotypic responses. By aligning differentially expressed genes and regions of correlated gene expression with QTL maps, a relatively small set of genes are identified, providing a shortcut for finding genes responsible for stress tolerance phenotypes. A collection of genetic materials—NILs with characterised disease QTL, NILs carrying Al toxicity tolerance, salt and P-deficiency tolerance—has been produced, paving the way for molecular cloning. Candidate genes and tightly linked markers for crop improvement in marginal environments are now available for use in selection.

3.3.3 SP3: Trait capture for crop improvement

Efforts have been made to reinforce phenotyping capacities within GCP. This is by developing information on methods facilitating better definition of the testing environment, and a more accurate choice and measurement of phenotyping traits especially in water-limited environments. Combining wide crosses and recent genetic and molecular techniques has led to the development of new synthetics in groundnut, thus increasing the available genetic diversity and opening access to new sources of disease resistance and drought tolerance. In rice, many interesting traits can be introgressed into Asian rice (*Oryza sativa* L.) from African rice (*O. glaberrima* Steud.). The combination of accurate crossing schemes with the latest genetic marker technologies allowed generating introgression lines ready for the rice breeders. Some markers have been developed and validated for resistance to leaf diseases in wheat and maize, and for resistance to *Striga* in cowpea. Significant progress has been made in developing low-

cost assay technologies for gene-based assisted selection for grain quality in maize, and pest and disease resistance in rice and cassava. Most markers have been refined, tested and are ready to be disseminated in breeding programmes.

3.3.4 SP4 Bioinformatics and crop information systems

The major achievement of SP4 so far is the community built from an extremely diverse set of actors, each with their own institutional culture, approaches and solutions. There is now a functioning group of software developers, bioinformaticians and biometricians creating products on the basis of common standards and methodologies. The selection and introduction of these standards and methodologies, supported by the implementation of collaborative development environments such as the GCP on CropWiki and on CropForge, can also be considered major achievements.

On a more technical level, 2006 was a critical time to create a solid basis for the bioinformatics platform: domain models and data formats have been developed, the technology for web-services has been made 'GCP-ready' and has been rolled out to the Consortium, supported by training and initial installations.

SP4 also coordinates transfer of technology: in 2006, ICRISAT's LIMS was installed at BecA (Nairobi) and IITA–(Ibadan)**.** Finally, some major tools supporting the other SPs have been developed such as iMAS, a bioinformatic interface for marker-assisted selection.

3.3.5 Capacity-building and enabling delivery

The achievements of SP5 (Capacity-building and enabling delivery) are described in Section 4 directly below.

4. Progress on other activities

4.1 Capacity-building

Subprogramme 5, Capacity-building and enabling delivery, is GCP's product delivery arm. At GCP, capacity-building is not an independent stand-alone activity. Rather, it is firmly anchored in the direct activities of all the other SPs (1 to 4). As GCP matures and generates more and more products, capacity-building and product delivery are also evolving and increasingly coming to the foreground. For instance, GCP's new strategy requires that all new project designs have a clear product delivery plan. The role of SP5 is therefore not an end-of-pipeline activity but right from conceptual stage.

2006 Impact Highlights

- Course on genetic resource policies and freedom to operate assessed
- Global Genotyping Support Service for NARS launched, bridging laboratory and field research
- Delivery Plan Kit developed for implementation in 2007 to streamline research product management and delivery
- *Ex ante* impact targeting conducted for regions, crops and traits to guide decision-making and resource allocation
- Concept for *à la carte* (tailor-made) capacity-building for applied research NARS teams developed
- IP Helpdesk for the GCP community launched to help implement the GCP Consortium Agreement in the context of the broader IP context

In 2006, GCP continued to facilitate and enhance NARS scientists' capacity to participate in GCP activities through GCP Fellowship and Travel Grant Programmes, training materials, courses and contributions to special conferences. In close collaboration with the other SPs, SP5 developed a new customised capacity-building concept, dubbed 'Capacity-building *à la carte'*. This concept guided a proposal call to identify and provide tailored capacity-building to applied research NARS teams engaged in GCP-related research.

The product delivery strategy developed in 2005 was implemented by SP5 in 2006. As a result, one of the first products rolled out was the Genotyping Support Service (GSS) launched in mid-2006. The GSS gives NARS access to molecular technology to analyse their germplasm and to learn how to use the resulting data.

Another major achievement was the development of the Delivery Plan Kit to ensure proper project design and implementation of GCP projects. Essential to the proper use and effective dissemination of new technologies is 'expert escort' to users. An example is the online intellectual property (IP) Helpdesk[3], functional since 2006. The Helpdesk answers questions on IP issues, and provides the GCP community with general information on IP and access and benefit-sharing (ABS).

[3] IP Helpdesk accessible at: http://www.generationcp.org/iphelpdesk.php?da=0629604

4.2 Data management

The value of the data generated within GCP largely depends on how they are stored, managed, made accessible and analysed. The value of the analysis will, in turn, depend on the availability of analytical tools and other information sources.

Subprogramme 4 rises to the challenge of linking and integrating these information components and analytical tools into a coherent information gateway. A bioinformatics, biometric and advanced data management system is being designed to support an integrated information network for genetic resources, genomics and crop improvement This platform will provide access to GCP data, as well as tools to analyse these data. Furthermore, it will link GCP data and tools to the global biodiversity and bioinformatics networks.

2006 was characterised by a large amount of data released and the amount of data stored in the GCP Central Registry is increasing exponentially.

Because data release by partners is a challenging and critical issue to the success of a large network like GCP, a data release policy was launched in 2006 and is clearly indicated in all new contracts. Principal Investigators (PIs) are responsible for quality check, compliance with template and data release and validation. Data must be released within six months of the end of the project and this is now explicitly stated in the contract. A grace period can be negotiated, but the 20 percent balance of project funds will not be paid until data are submitted. Once data are in the Central Registry, the SP Leader verifies and authorises final payment.

The next step is to have a GCP curator run half-yearly quality checks on data based on quality indicators (to be defined). If no major errors, the data will be labelled as screened by GCP. Questionable data will be sent back to PI for cleaning.

4.3 Communications/Public awareness

GCP communications aim to facilitate information flow within GCP as well as to establish and maintain a positive public image of the Programme. The GCP Web site (www.generationcp.org) is the primary vehicle for both of these objectives. In 2006, the site got more than 3,000 hits per month. As a general rule, GCP makes all its documents available for public access via the Web site. Here, you will find under one roof our history, structure, composition, policies and procedures.

We also publish news items and events of interest to the plant molecular genetics and breeding community. In 2006 our electronic newsletter, *GCP News,* reached more than 2,000 subscribers.

In addition, we published several corporate documents for 2006 including the annual report, Partner and Product Highlights, Annual Research Meeting Proceedings and the rolling Medium-Term Plan and the annually updated GCP Manual—a handy publication for orienting new staff, donors and anyone interested in GCP's history and structure. All of these documents are accessible on our 'Recent publications' page.

5. Governance and management

GCP has several bodies to oversee governance and management. Major achievements and changes in composition in 2006 are presented in this section.

In 2005, GCP's Programme Steeering Committee (PSC) established a Task Force on Governance Structure to review GCP's governance. The Task Force developed a set of options and recommendations for reform, which were presented during the 2006 PSC meeting. More details on the review are in the 'Lessons learned' section (Lesson 6: Governance).

Below is a brief description of GCP's current governance and management.

5.1. GCP Consortium

The Generation Challenge Programme unites three sets of partners, who together make up the GCP Consortium: these include 9 CGIAR centres, 6 ARIs, and 7 NARS.[4] Each member of the Consortium group must adhere to the Annual Operating Plan and Annual Budget as established by the Programme Steering Committee (PSC).

In 2006, the Australian Centre for Plant Functional Genomics applied for Consortium membership. The PSC ruled that the application be shelved pending the approval of recommendations from the Task Force. Likewise, for provisional members approved in 2006,[5] their ratification as full consortium members shall be postponed until the Task Force completes its work.

5.2 Programme Steering Committee

The PSC is GCP's peak governing body, established under clause 7 of the Consortium Agreement, with 19 voting members and an independent Chair. PSC members are drawn from the GCP Consortium. The PSC is responsible for overall management and governance of the Challenge Program. The major responsibilities of the PSC are to approve:

- the Annual Report and upcoming yearly workplan/operating plan, including budgets
- the Medium-Term Plan of the CGIAR (to be submitted to the CGIAR Science Council)
- new Consortium members and amendments to the Consortium Agreement.

In addition to the above, the PSC is also responsible for policy, the Director's workplan and evaluation, finances and resources, intellectual property and other general issues.

[4] Full list of Consortium members available at: http://www.generationcp.org/gen.php?da=0781248

[5] Centro de Investigación y de Estudios Avanzados (CINVESTAV); Institut National de la Recherche Agronomique (INRA); Instituto Agronomico per l'Oltremare (IAO); and National Center for Genetic Engineering and Biotechnology (BIOTEC).

In 2006, besides reviewing the terms of reference of the Governance Task Force, the PSC also approved:

- GCP's statement on use of transgenics.
- Audit of GCP by the CGIAR Internal Audit Unit conducted in October 2006.
- Formal Host Agreement between CIMMYT and the GCP

5.1.3 Management Team

The Management Team (MT) is accountable for operational policy, implementation management and delivery of research projects. The MT also decides on the research portfolio that includes commissioned projects and research themes for be announced in the competitive calls. The GCP Management Team is composed of the Director and the five Subprogramme Leaders.

Consistent with our view on the importance of product management and delivery, in 2006, SP3 and SP5 leader positions were adjusted from half-time to full-time positions. The SP3 Leader position now also includes product management to ensure the flow of products along the research–delivery chain, while the SP5 Leader, in addition to managing capacity-building, will continue to be responsible for product marketing and delivery outside GCP. This realignment is necessary for a growing Programme with nearly 70 projects generating massive data and multiple and numerous products.

5.1.4 Advisory Committees

a) The Review and Advisory Panel (RAP),[6] constituted in 2005 by the Management Team**,** provides independent scientific input, feedback and advice to the Management Team on research themes, individual research projects, the Annual Research Meeting and site visits to research projects. It is comprised of five internationally recognised scientists with in-depth expertise in one of the five Subprogrammes, as well as experience in the international agricultural arena.

   RAP is also tasked with reviewing commissioned research projects within the Subprogramme, providing an objective expert assessment on the progress of the commissioned projects. This is an important monitoring and quality assurance function since commissioned projects are not subjected to the same rigorous peer review as are competitive projects. In addition, RAP members attend the ARM where they review Subprogramme projects in the SP-specific meetings and provide SPLs with written feedback on the projects.

b) The mandate of the Stakeholders Committee (SHC) is to facilitate the articulation, promotion and presentation of the views of various stakeholders to the GCP management and governance structures in order to contribute to GCP's policies, strategies, research priorities and activities. The SHC conveys the views and perspectives of the various stakeholders it represents to both the PSC and the MT. Due to various factors, the SHC interacted less with the MT compared to previous

[6] List of 2006 RAP members available at: http://www.generationcp.org/gen.php?da=0781418

years. Under the leadership of a consultant, in October 2006, SHC produced a report on GCP governance.
In this period when the entire GCP governance structure is under review, there are plans by the European Commission (EC), GFAR and GCP's Management Team to revamp and revitalise this vital Committee, and dialogue has already been initiated.

c) According to its terms of reference, the Programme Advisory Committee (PAC) is supposed to provide an independent scientific review of research themes and projects, and select competitive projects. However, this committee has so far not been functional. Nevertheless, the PSC receives some external feedback on GCP's scientific achievements through Dr. Wayne Powell, an internationally recognised expert on plant genetics, and the current Chair of the PAC.

More details on GCP's governance and management are in the 'Lessons learned' section, including operational issues and challenges. Given that GCP's governance is currently under review, this section is a better home for discussion on issues and challenges related to governance and management.

6. Revenue and expenditure

The 2006 summary financial report (statement of income and expenses plus statement of changes in net assets and resource allocation) is in Appendix B. Financial information presented for 2006 is based on actual year-end financial reports.

6.1 Financial objectives and outcomes

GCP has maintained a healthy financial position, thanks in large part to support from committed funders. Our major funders are the EC, the UK's Department for International Development (DFID) and the World Bank—in 2006, they jointly contributed about 90 percent of our total income. The Rockefeller Foundation, the Swiss Agency for Development and Cooperation and the Swedish International Development Cooperation Agency also support GCP.

Income:
Our total actual 2006 income was US$15.5M, including other income (interest) of US$327K. The income for 2006 (US$15.5M) is higher than 2005 (US$14.2M), mainly due to the following:

- A special contribution from the World Bank of US$1.3M. Note that the original World Bank support was reduced by US$ 500K (US$2.5M in 2005 compared to 2.0 M in 2006).
- New funding from Switzerland amounting to US$370,000.
- An increase in the EC contribution of €100,000 (2005 contribution received in February 2006).

Grant income amounted to US$15.2M with contributions in the following percentages: 37% from European Commission; 31% from United Kingdom (DFID); 13% from World Bank (regular contribution); 8% from World Bank (special contribution); 7% from Rockefeller Foundation; 2% from Switzerland (SDC); and 1% from Sweden (SIDA)

Expenditure:
2006 actual expenditure amounted to US$13.0M, of which approximately 85% went directly to supporting the research and capacity building efforts of GCP and its partners. The 2006 net surplus was of US$2.5M (see note on carryover below, 6.5).

The 2007–2009 MTP developed in 2006 projected 2006 expenses at US$15.3M, reflecting a US$2.3M difference with actual expenditure. This difference was due to various commitments for 2005 and 2006 being transferred to 2007.

Perspective:
Despite a temporary setback, funding prospects for GCP are positive for 2007 and the years that follow. Although funds are not secured yet, we have indications that DFID will maintain their contribution to GCP at the same level as previous years. We have also been informed that because of the problem that occurred in 2006, the 2007 EC contribution will include as compensation money not disbursed in 2006. Switzerland also began supporting GCP at the end of 2006. The new Bill & Melinda Gates Foundation-

funded legume project represents an increase of about 20% above our 2006 income (see 6.5).

6.2 Schedule of contributions received (by CP donor and amount)
See Appendix B

6.3 Schedule of disbursements to partners (CGIAR and outside)
See Appendix B

6.4 Resource Allocation/Expenditure (by subprogramme; Priority area, object of expenditure)
See Appendix B of this report, and Appendix B of MTP 2008–2010 for real resource allocation/expenditure by subprogramme and priority area.

6.5 Other issues on financial management
Carryover:
After deducting the GCP contingency reserve of US$1.0M and the special contribution for the World Bank that was outstanding at the end of the year, net assets at the end of the 2006 financial year represented approximately US$6.0M. This amount was higher than originally budgeted, reflecting the delay in disbursing some funds due, in part, to GCP requirements and also due to delayed receipt of some donor contributions, as we received about US$3.0M of 2006 funds in December 2006. From this US$6.0M, about US$ 2.8M is already committed for 2007 activities and paying the remaining 20% of some activities conducted in 2006. The uncommitted carryover for 2007 therefore amounts to US$3.3M. Because of our reduced contingency reserve compared to that of a CG centre, we must keep a significant amount of uncommitted carryover every year as a buffer in case of unexpected changes in our funding.

Non-disbursement of the 2006 EC funds:
The EC contribution alone accounts for about 40% of our annual budget. Because the EC and the World Bank were unable to arrive at a working arrangement for disbursement in 2006, the EC contribution was formally cancelled in November 2006, significantly crippling GCP operations in 2007. However, most of the 2006 funds should be recovered in 2007, on top of the 2007 contribution, and the EC's support to GCP remains unwavering. Because the non-delivery of the EC's 2006 CGIAR contribution resulted in significant negative impact on the CGIAR's 2006 operations, the CG secretariat allocated US$6M from the World Bank's CGIAR account as partial compensation for the loss of EC funds. This compensation, accounted for as 2006 revenue, was calculated on a pro rata basis for the resources allocated by the EC to different Centres and Challenge Programmes, and GCP received US$1.3M.

New major project for 2007:
In 2006, we developed a major special project on 'Improving tropical legume productivity for marginal environments in Africa'. The project will promote modern breeding to improve the productivity in sub-Saharan Africa of four legumes (groundnuts, cowpeas, beans and chickpeas). The three-year project will develop key genomic

resources that are currently lacking, identify molecular markers for important traits and improve breeding capacity in sub-Saharan Africa. It will be a collaborative project between US universities, CGIAR centres, EMBRAPA and NARS in sub-Saharan Africa. Research activities will commence in 2007. This project supported by the Bill & Melinda Gates Foundation will generate new income amounting to US$9.6M.

7. Lessons learned (Submission/feedback from the GCP Management Team)

Lesson 1: Revisiting the strategy

We have revised and refined our strategy based on practical experience and emerging issues from our first two establishment years (see 'Research strategy and priorities'). Our new Strategic Framework will ensure informed decision-making and priority-setting and it shall guide GCP's activities in the final years of Phase I and the beginning of Phase II. We are also refining the notion of 'products' in the context of GCP and how best to manage them.

The Management Team strongly believes that GCP's long-term success will depend mainly on the ability to learn from our experiences, and to make the appropriate adjustments in both strategy and structure.

Analysis

- The original strategy was too broad and ambitious from the beginning, aiming at all the target crops of the CGIAR and the entire Global South
- However, having a primary trait of focus (drought) was a critical rallying point

Lesson 1a: It is risky to aim too high since it results in spreading too thinly on the ground. Without clear target areas and crop prioritisation, it is unrealistic to expect significant impact considering the current GCP budget and the fact that we are a time-bound programme.

Lesson 1b: Steadfastness of purpose: it is vitally important to continually build upon existing expertise within the CGIAR and focus where the strengths of the CG lie. Although drought is a very challenging trait due to its complex genetic basis, it has proven a real plus to focus on this area since there is resident expertise in the CGIAR.

Conclusion We believe refining our research strategy and identifying our 15 target farming systems has sharpened our focus and informed the selection of new commissioned projects to be initiated in 2008, in particular in Subprogrammes 3 and 5. Nonetheless, GCP remains dedicated to the exploration and characterisation (genotyping and phenotyping) of diversity in staple crops, and will continue to support this core effort.

Lesson 2: Different but complementary funding mechanisms

GCP has four complementary kinds of research activities: competitive grants, commissioned research projects, special projects and research conducted by half-time SPLs with discretionary funds.

Competitive projects are now thematic and typically 2-3-years. They are complemented by commissioned projects, which are designed to add value to the array of genetic and

genomic resources publicly available through GCP by addressing a specific need, or by collating outputs from research projects. For special projects, budget and activities are developed in close collaboration with funders based on specific requirements. A fourth mechanism is based on discretionary funds granted annually to GCP's half-time SP leaders (SPLs) to conduct research directly applicable to SP objectives. Results from this research count as specific GCP outputs.

Analysis

- The spread across competitive and commissioned research projects is about fifty-fifty.
- GCP's management realises that a good balance between the three kinds of project is important to optimise programme efficiency.

Lesson 2: We want to continue to capture new ideas and approaches, and to bring in partners that fit our research priorities, keeping the flexibility of consolidating our project portfolio around the most important and most promising axes.

Conclusion: The three main funding mechanisms have proven very satisfactory. GCP would like to have a competitive call about every 18 months and we will continue to devote a significant portion of our budget to competitive grants.

Lesson 3: A holistic perspective on product management and delivery

We have launched tools and templates to facilitate product management and delivery, and several more are under development. For every new major project, a delivery plan is now required. Product management and product delivery are the purview of Subprogrammes 3 and 5 respectively.

Product management and product delivery are intertwined: product management ensures the flow of products along the research–delivery chain. Product management helps to identify the best options for returns on value-adding investments. It comprises identifying, gathering, and validating research results to reach different potential users. We are currently developing a concerted strategy for product management and product delivery.

GCP has a really wide spectrum of products and at almost every step along the GCP research pipeline, products generated can directly impact breeding efficiency, or can be used in the next step of the pipeline. The products can be classified into five broad categories: genetic resources, genomic resources, validated markers for breeding, new tools and methodologies and training material. Once they have been validated, products can be widely disseminated.

Analysis

- GCP's Subprogramme 5 on Capacity-building and enabling delivery is a crucial window for visibility and impact.
- Visibility and impact in turn critically depend on effective product management, which precedes product delivery.

Lesson 3a: Product management and delivery are critical in linking upstream research and the deployment of research-based products that will have tangible impacts on agriculture.

Lesson 3b: Local validation, which confirms the suitability and potential benefit of a given product in a given environment, is central to product management and must precede delivery.

Conclusion: Based on our experience, the MT believe that all CPs would greatly benefit from having a window similar to SP3–SP5, which ensures a focus on product validation followed by delivery in both the short and long term. Such focus may require strategy adjustment.

Lesson 4: Scientific overview

The Management Team considers the following scientific overviews as important to our work.

i) Review and Advisory Panel (RAP)

A group of five experts selected by the respective SPLs to serve as internal reviewers of projects within each SP. The RAP participates in GCP's Annual Research Meetings, provides the MT with feedback on SP research and reviews commissioned research proposals. RAP members may occasionally accompany their respective MT member for on-site visits to GCP partner institutions.

ii) External review panel

This independent panel screens proposals for competitive grants. The panel is comprised of prominent scientists in the thematic target areas. The GCP Director nominates panel members. The panel's operational guidelines are developed by the MT and implemented by the Director. The chair of the PAC has access to all the information related to the selection process of the competitive grants, thus ensuring transparency and fairness of the entire process.

iii) External target reviews (ETRs)

This is a new mechanism proposed by the MT, under which projects related to a given area are to be identified at Subprogramme level for external review by a panel of two to three experts. ETRs would complement and further enrich RAP reviews.

iv) Funder and CGIAR reviews

The periodic external reviews commissioned by funders and the CGIAR are an additional avenue for independent external review. GCP is slated to have its first External Programme and Management Review (EPMR) in October this year commissioned by the Science Council of the CGIAR.

Analysis

- Monitoring and quality assurance are both critical for the implementation and success of the Programme.

Lesson 4a: The MT considers RAP as extremely effective, functioning as an independent and objective 'internally' commissioned and continuous review panel.

Lesson 4b: It is essential to strike a good balance between internal and external reviews. Internal reviews are well-suited to felt needs and are conducted at the appropriate time in terms of project maturity. External reviews confer credibility and provide opportunity to compare experiences and benefit from new ideas.

Conclusion 1: Essential mechanisms for effective review are internal reviews, appropriate scientific experience at governance level (or through external expertise) and external reviews—both internally and externally commissioned.

Conclusion 2: Considering CPs are time-bound initiatives created to deliver high impacts in the short term, objective and continuous self-assessment (and making the adjustments necessary) is essential if the CPs are to deliver on these great expectations and demonstrate returns on investments.

Lesson 5: Composition of the Management Team

In GCP's early years, all the SPLs were on a half-time split between GCP and the research institutions where they were based. As GCP grows and evolves, and if we are to deliver on our new strategy, this approach is no longer viable. Consequently, consistent with our view on the importance of product management and delivery, we realigned the Management Team. SP3 and SP5 leader positions were adjusted from half-time to full-time positions. The SP3 Leader function now also includes product management to ensure the flow of products along the research–delivery chain, while the SP5 Leader, in addition to managing capacity-building, will continue to be responsible for product marketing and delivery outside GCP. Both the full-time SPLs are based at GCP's Mexico headquarters.

Analysis

- With three half-time SPLs, the spread across full-time and half-time SPLs is nearly fifty-fifty for the five SPLs, and at fifty-fifty for the six MT members.

Lesson 5a: The mix of half-time and full-time SPLs is a favourable compromise between breadth and depth, giving on the one hand a good mix of dedication to science and depth at the Subprogramme level, and on the other hand dedication to broader overarching issues at Programme level.

Lesson 5b: The MT faces communication challenges on account of being a geographically distributed virtual team, with fairly limited face-to-face interactions. It is essential to have a critical mass in a single location.

Conclusion 1: We believe the shortcomings in effective communications are adequately counterbalanced by the diversity and enrichment in science that our current structure assures.

Conclusion 2: We also believe that beyond the establishment years, having all SPLs at half-time would be imprudent. Likewise, having all SPLs in full-time positions would be unwise. Full-time position must be restricted to SPLs whose positions, in addition to scientific work, also have substantial managerial responsibilities requiring frequent face-to-face interactions.

Lesson 6: Governance

Efficient governance is imperative since governance and administration guide effective strategy development, implementation and ultimately research management itself. The Consortium Agreement defines the governance structure. In the evolving Generation Challenge Programme the composition of the Consortium and the governance structure are under constant review.

Programme Steering Committee (PSC)

The Program Steering Committee (PSC) is responsible for overall management and governance of the Challenge Program. PSC composition mainly comprises representatives of Consortium members, a few *ex-officio* members and an independent Chair.[7]

In 2005, the PSC set up a Task Force on Governance Structure to review GCP's governance and members' rights and obligations as stipulated in the Consortium Agreement.[8] The Task Force developed a set of options and recommendations for reform, which were presented during the 2006 PSC meeting. However, the PSC did not endorse the proposed recommendation since further clarity was needed on some fundamental issues on GCP's identity. Therefore, the Task Force's Terms of Reference were revised: new recommendations for reforming GCP's governance were tabled, and a final decision will be made when the PSC meets in early December 2007. Any changes in governance will affect the Consortium Agreement, and could also have implications for Consortium composition.

Programme and Advisory Committee (PAC)

The Programme Advisory Committee[9] (PAC) was created to provide independent scientific advice to the PSC. PAC's Terms of Reference require a membership of four to six distinguished internationally recognised scientists in various fields related to GCP's work. To date, the PAC has not been functional and its role is under review by the PSC's Governance Task Force. However, the Chair of the PAC, Dr Wayne Powell, has been

[7] For full details on GCP's governing bodies and their roles, refer to the *GCP Manual 2006*, pp10–15, available at: http://www.generationcp.org/comm/manual/GCPmanual_public_2006.pdf
[8] GCP Consortium Agreement accessible at: http://www.generationcp.org/whoweare.php
[9] For more details on the PAC, refer to the GCP Manual 2006, pp14–15, available at: http://www.generationcp.org/comm/manual/GCPmanual_public_2006.pdf

very active and followed GCP research progress since the establishment of the Programme.

Stakeholder Committee (SHC)

The Stakeholder Committee (SHC) serves as a neutral platform for inter-stakeholder dialogue, and as a link between GCP and the various stakeholders such as farmer groups, NGOs, CSOs and the private sector. The SHC provides input and feedback to the PSC, and recommendations to improve multi-stakeholder involvement, especially from the global South and civil society. The GCP Director and the SP5 Leader are the liaison with the SHC.

Analysis

- With 19 voting members, the PSC has grown beyond the scale for optimal governance. The SHC has voiced particular concern on the PSC's size and composition.
- The revision of the GCP governance body will have implications on the Consortium Agreement, and eventually on the composition of the Consortium.
- There is an inherent conflict of interest between the PSC and defining research priorities for GCP.
- PAC is dysfunctional as it operates 'above and outside' the Programme. As currently structured, PAC cannot bring in the much-needed scientific experience in governance.
- The Management Team recognizes the value of a SHC.

Lesson 6a: It is not sound business practice for an organisation's board to be composed almost exclusively of direct recipients of funding from the organisation.

Lesson 6b: The size of the current PSC (19 voting members) makes GCP governance difficult and runs counter to GCP's efforts to be 'lean and mean'.

Conclusion 1: While bringing all parties on board was well intended in the interests of inclusion, with time and experience, it is equally important to strike an optimal balance between representation, objectivity and efficiency.

Conclusion 2: We need external views in our board with a balance of suitable expertise (management, scientific, legal, and financial) for the board to adequately serve—and comprehensively evaluate—GCP.

Conclusion 3: The Consortium has several advantages. For instance, the Consortium Agreement clearly spells out issues related to germplasm exchange and IP in an international setting. However, the rights and obligations of Consortium members need to be better defined, as well as the mechanism for accepting new Consortium members.

8. Appendices

8.1 Appendix A: Summary of outputs by Subprogramme

Project/Activity	Status	Results
Subprogramme 1: Genetic diversity of global genetic resources		
Genotyping, marker development for analysing diversity in major food crops	• Germplasm analysis for GCP crops. • New genotyping methods assessed for whole-genome profiling.	• Representative samples finalised for six crops • SSR markers identified for 10 crops
Targeted genotyping for candidate genes	79 drought-related maize genes under study	Successful efforts to develop comparative diversity studies for ABA-Stress–Ripening (ASR) protein genes.
Genetic base in rice increased	• Interspecific introgression population panels between Asian and African cultivated rices refined; interspecific backcrosses with various wild species. • Vibrant international collaboration opening up avenues for further research.	Five interspecific genetic maps developed, two populations (*O. sativa* x *O. glaberrima)* advanced towards fixation of chromosome segment substitution (CSS), four cultivated x wild BC1F1 populations were genotyped, four cultivated x wild BC2F1 populations derived.
Subprogramme 2: Comparative genomics for gene discovery		
Enhanced public genomic and genetic resources	• New pearl millet ESTs generated from differential cDNA libraries. • *Musa* EST anchored to the rice genome, and additional genomic resources (BAC and EST sequences, SSR markers) generated. • Contribution to the production of SNP data across the genomes of 20 rice lines.	• Significant addition to the pearl millet EST resource. • Additional genomic resources (BAC and EST sequences, SSR markers) generated for *Musa*[10]. • Full dataset generated from Perlegen Sciences. Preliminary statistics show a total of about 260,000 SNP calls, yielding an average of 2.6 SNP per 1,000 base pair (bp) between a pair of

[10] See http://www.musagenomics.org

Project/Activity	Status	Results
		rice lines. As of mid-2007, the OryGenes database[11] developed at CIRAD has over 140,000 insertion sequences tagged by flanking sequence tags (FSTs) on the rice genome.
Bridging the gene–phenotype gap with transcriptome analysis	Foundation for further research: genome-wide expression patterns in a pair of isogenic lines can inform chromosomal introgression, and hence can lead to efficient identification of candidate genes responsible for target traits.	Demonstrating the potential of applying transcriptome analysis to shortlist candidate genes.
Candidate genes and genetic regions for stress tolerance identified	• significant progress on aluminium toxicity for sorghum and maize. • 288 maize lines phenotyped for Al tolerance. • Candidate genes for tolerance to salinity and P-deficiency identified.	• Maize: research ongoing on six genes were found associated with maize Al tolerance. • Rice: markers identified which together with genome-wide markers, can be used in marker-assisted backcrossing (MAB) to transfer *Saltol* into popular varieties. 25 candidate genes shortlisted for P deficiency.
Subprogramme 3: Trait capture for crop improvement		
Phenotyping approaches and protocols.	Phenotyping intensively discussed during GCP's 2006 Annual Research Meeting (ARM).	• Phenotyping document to be published describing new approaches and providing guidelines for a series of crops. • Platforms to be established for analysing GCP reference collections and segregating populations.
Support-systems for	A range of facilitating	Simulation work based on

[11] See http://orygenesdb.cirad.fr

Project/Activity	Status	Results
marker-assisted selection	technologies, such as simulation, modelling and decision-support tools, are essential for rapid and widespread adoption of molecular breeding approaches and tools in conventional breeding.	wheat breeding at CSIRO aims to identify optimal strategy (nature and size of segregating populations) to combine known genes (using perfect or near-perfect markers) into single genotypes for use as parents for further field screening.
Molecular breeding systems pilot-tested with simply inherited traits.	Limited number of validated markers for drought tolerance. Urgent need to promote use of markers in some of GCP's target environments. As a compromise, markers for simple inherited traits to be used.	Essential methodological insights for routine, large-scale marker conversion activities once GCP develops gene-based technologies for drought tolerance.
Experience and technologies transferred to less-studied crops	A groundnut project is using wide crosses and molecular marker analysis to drive a new paradigm in groundnut breeding based on the successful use of synthetics in breeding of other complex polyploid crops, such as wheat and canola.	GCP investments are already catalysing exciting new approaches to breeding less-studied crops. For groundnuts, Given the narrow genetic base of groundnut varieties, this approach is likely to have large impacts on groundnut breeding.
Subprogramme 4: Bioinformatics and crop information systems		
Web services	Short-term low-tech solution found and templates for data storage designed	Common portable format facilitating data sharing. Central Registry populated
ICRISAT's Laboratory Information Management System (LIMS)	LIMS adapted, and installed at BecA and IITA	Much more reliable data handling and thus higher quality data production
Developing appropriate MAS software	iMAS software is being extensively tested by potential NARS users from, for further improvement and to help determine additional tools to be added to iMAS.	iMAS released as a stand-alone application
Subprogramme 5: Capacity-building and enabling delivery		
Genotyping Support Service	Continuous improvement	Facilitating access by

Project/Activity	**Status**	**Results**
(GSS)	based on user feedback and GSS to be extended to more crops.	national researchers to genotyping technologies
Delivery Plan Kit (DPKit)	To be implemented in 2007 with the six new competitive project and the tropical legumes project.	Ensures proper project design and implementation, through prompts on expected products and users.
Ex ante impact targeting	Needs-driven resource allocation for measurable impacts to solve the problems of resource-poor farmers.	Identification of geographical areas with a high incidence of poverty and high drought risk, and the crops grown and consumed there.
A la carte capacity-building	Transit from individual Training Fellowships (to be phased out in 2009) to team capacity-building.	Customised capacity-building for teams.
IP Helpdesk	Support to GCP member institutions, scientists and staff to fulfil Consortium-related IP management requirements	Providing an understanding of the GCP Consortium Agreement, thereby facilitating its implementation.

8.2 Appendix B: Generation Challenge Programme: Revenue and expenditure

See attached MS-Excel spreadsheet

Appendix B: Generation Challenge Program
Revenue and Expenditure
(USD)

For the year ended December 31, 2006

Contributions Received		
Donors		
DFID [1]/		4,730,626
EC [2]/		5,673,840
Pioneer		20,000
RF		1,044,147
Sweden [3]/		97,552
Switzerland [4]/		369,505
World Bank [5]/		2,000,000
World Bank [6]/		1,256,000
Earned Income		**15,191,669**
Interest income		327,106
Total Revenue		**15,518,775**
Expenditure		
Partners		
CG Centers		
BIOVERSITY		963,150
CIAT		1,029,322
CIMMYT		1,083,308
CIP		342,522
ICARDA		364,792
ICRISAT		490,207
IITA		496,038
IRRI		2,303,510
Total CGIAR Centers		**7,072,850**
ARIs		
Agropolis/Cirad		1,525,921
University of Cornell		626,672
University of California-Davis		17,000
WUR (University of Wageningen)		520,881
Total ARIs		**2,690,474**
NARS		
ACGT (African Centre for Gene Technologies)		85,792
CAAS		177,588
EMBRAPA		701,769
JIC (John Innes Centre)		16,000
NIAS		314,326
University of KwaZulu-Natal		100,132
Others (Fellowships & Travel Grants)		25,944
Total NARS		**1,421,551**
Sub-total [7]		**11,184,875**
Program Management [8]		
Personnel		323,737
Supplies and services		1,467,809
Travel		54,754
sub-total		**1,846,300**
Total Expenditure		**13,031,175**
Excess of Revenue over Expenditure (Surplus)		**2,487,600**
Balance brought forward from 2005 and previous years		
Designated - Opening balance	4,853,435	
Undesignated - Contingency Reserve	1,000,000	**5,853,435**
Cummulative balance		**8,341,035**

[1]/ Equivalent to GBP 2.5m

[2]/ Equivalent to EUR 4.7m

[3]/ Equivalent to SEK 0.700m

[4]/ Equivalent to CHF 0.450m

[5]/ Annual Contribution

[6]/ Special 2006 Contribution from WB expected to be received in early 2007

[7]/ The figures reflected in the total CG/ARIs/NARS disbursements do not reflect subcontracts to other institutions. The actual breakdown of GCP funds for research is approximately 50/25/25 percent for the CG/ARIs/NARs respectively

[8]/ Transaction costs $1.273m

Of which:

$ 480k Secretariat Costs (Salaries&Benefits IRS & NSS, and Office costs)

$ 793k PSC, ARM, Stakeholders Committee, AGM, Extermal Review Team)

$1.273 m

Note: GCP financial figures are based on Schedule included in Cimmyt's Audited Financial Statements (2006)