



POSITION PAPERS GCP CAPACITY BUILDING



Paper No. 9: Training, learning resources
and infrastructure development



GCP in collaboration with external experts has drafted a series of 11 Position Papers (listed below). Two of these 11 papers are 'big-picture' papers on: (a) Programme level overview, and, (b) a synthesis of all the research aspects combined. The other nine component-specific papers drill down into each component, and cover four main areas: (i) research – 5 papers; (ii) services – 1 paper; (iii) capacity building – 1 paper; and, (iv) communications and knowledge sharing – 2 papers.

The goals are to communicate component-level outputs and deliverables during the Programme's lifetime (2004–2014), list products and outcomes, and explore options for enabling and ensuring that the potential benefits of these components will be fully realised in the future. At this stage, the Position Papers are essentially a very preliminary analysis primarily for internal use, but made publicly available in keeping with GCP's culture of transparency and sharing information.

Each of the nine component-specific Position Papers is designed to contribute to GCP's orderly closure in 2014 by considering the following three questions:

1. What assets will be completed by the end of GCP's lifetime in December 2014?
2. What assets can best continue as integral components of the CRPs or elsewhere?
3. What assets may not fit within existing institutions or programmes and may require alternative implementation mechanisms?

The papers were drafted in July–August 2012, externally reviewed in September 2012, and endorsed by the Taskforce, the GCP Executive Board (September–October 2012) and the Consortium Committee (November 2012). Initially conceptualised as 'white papers' to clarify the issues at hand and to help with decision-making by the Taskforce, Consortium Committee and Executive Board, they subsequently advanced to 'Position Papers' in December 2012, once input from these groups as well as external reviewers was incorporated.

List of Position Papers

Context and synthesis

1. Programme overview
2. Research synthesis

Research components

3. Genetic stocks
4. Genomic resources
5. Informative molecular markers
6. Cloned genes
7. Molecular breeding

Services

8. Integrated Breeding Platform

Breeding tools and services spanning:

- a. Breeding information and communities of practice
- b. Data management software
- c. Analysis and decision-support software
- d. Data management service
- e. Breeding and support services

Capacity building

9. Training, learning resources and infrastructure development

Community and knowledge sharing

10. GCP's scientific and social network
11. GCP's institutional memory



POSITION PAPERS ON GCP CAPACITY BUILDING

Paper No. 9: Training, learning resources
and infrastructure development

CGIAR GENERATION CHALLENGE PROGRAMME (GCP)

This paper has been authored by the GCP Management Team with input from the Transition Strategy Taskforce¹ and external reviewers (Theresa Fulton, Cornell University; Fred van Eeuwijk, Wageningen University and Research Centre, The Netherlands; Chikelu Mba, FAO Global Partnership Initiative for Plant Breeding Capacity Building (GIPB); Jeff Ehlers, University of California, Riverside, USA)

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 2012



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ACRONYMS AND ABBREVIATIONS

ACPGF	Australian Centre for Plant Functional Genomics, Pty Ltd
AfricaRice	Africa Rice Center
ARI-NRS	Agricultural Research Institute, Naliendele Research Station, Tanzania
BAU	Birsa Agricultural University, India
Bioversity	Bioversity International
CAAS	Chinese Academy of Agricultural Sciences
CARS	Chitedze Agricultural Research Station, Malawi
CB	capacity building
CBI	Crop Breeding Institute, Ministry of Agriculture, Zimbabwe
CERAAS	Centre d'étude régional pour l'amélioration de l'adaptation à la sécheresse, Senegal
CGIAR	No longer an acronym (formerly Consultative Group on International Agricultural Research)
CIAT	Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture)
CoPs	communities of practice
CORAF/WECARD	Conseil ouest et centre africain pour la recherche et le développement agricoles/ <i>West and Central African Council for Agricultural Research and Development</i>
CRI-CSIR	Crops Research Institute (of the Council for Scientific and Industrial Research), Ghana
CRPs	CGIAR Research Programmes
DAR	Department of Agricultural Research, Myanmar
DPI&F	Primary Industries and Fisheries–Queensland Government, Australia
EASTC	Embu Agricultural Staff Training College, Kenya (of the Ministry of Agriculture, Government of Kenya)

ACRONYMS AND ABBREVIATIONS

EgU	Egerton University, Kenya
EIAR	Ethiopian Institute of Agricultural Research
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation)
FAO	Food and Agriculture Organization of the United Nations
GCP	CGIAR Generation Challenge Programme
GIPB	Global Partnership Initiative for Plant Breeding Capacity Building (of FAO)
IAR	Institute for Agricultural Research, Nigeria (of the Ahmadu Bello University)
IARI	Indian Agricultural Research Institute (of the Indian Council of Agricultural Research)
IB-MYC	Integrated Breeding Multiyear Course (of GCP)
IBP	Integrated Breeding Platform (of GCP)
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	information and communication technology
IER	Institut d'Economie Rurale, Mali
IITA	International Institute of Tropical Agriculture
INERA	Institut de l'environnement et de recherches agricoles, Burkina Faso
INIFAP	Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, Mexico
INRAN	Institut National de la Recherche Agronomique du Niger
IP	intellectual property
IRAD	Institut pour la Recherche Agricole et le Développement, Cameroon
IRRI	International Rice Research Institute

ACRONYMS AND ABBREVIATIONS

ISRA	Institut sénégalais de recherches agricoles
MSc	Master of Science (postgraduate academic degree)
NaCRRRI	National Crops Resources Research Institute, Uganda
NAFRI	National Agriculture and Forestry Research Institute, Laos
NCRI	National Cereals Research Institute, Badeggi, Nigeria
NRCRI	National Root Crops Research Institute, Umudike, Nigeria
PhD	Doctor of Philosophy (postgraduate academic degree)
postdoc	postdoctoral research fellow
predoc	predoctoral research fellow
RI	Research Initiative (of GCP)
SARI–CSIR	Savanna Agricultural Research Institute, Ghana (of the Council for Scientific and Industrial Research)
SUA	Sokoine University of Agriculture, Tanzania
UoA	University of Aberdeen, UK
UAC	Université d'Abomey–Calavi, Benin
UAM	Université Abdou Moumouni de Niamey, Niger
UC–D	University of California–Davis, USA
UCAD	Université Cheikh Anta Diop, Senegal
UEM	Universidade Eduardo Mondlane, Mozambique
UFS	University of the Free State, South Africa
UoH	University of Hohenheim, Germany
UoN	University of Nigeria
WACCI	West Africa Centre for Crop Improvement

BACKGROUND AND PROCESS



A series of Position Papers has been drafted by the CGIAR Generation Challenge Programme (GCP) team in collaboration with external experts. The goals are to communicate the outputs and deliverables from each research component during 2004–2014, and to explore options for enabling and ensuring that the potential benefits of these components will be fully realised in the future.

The Position Papers are not static but dynamic in nature: they might evolve over time, shaped by progress made during GCP's remaining time, and our ability to implement our workplan as scheduled, and also shaped by the priorities of our partners. This dynamism is particularly pronounced in the 'moving landscape' of

socioeconomic, political and environmental issues in which the CGIAR operates.

Each Position Paper is designed to contribute to GCP's orderly closure in 2014, by considering the following questions:

- What assets will be completed by the end of GCP's lifetime in December 2014?
- What assets can best continue as integral components of the new CGIAR Research Programmes (CRPs) or elsewhere?
- What assets may not fit within existing institutions or programmes, and may require alternative implementation mechanisms?

This paper focuses on the outputs and options for GCP's capacity-building component.

GCP products have been achieved through: (a) collaborative work among three sets of actors – a broad network of partners in regional and country research programmes, in the CGIAR and in academia; and, (b) through capacity enhancement to assist developing-world researchers to tap into new genetic diversity and access modern breeding tools and services.

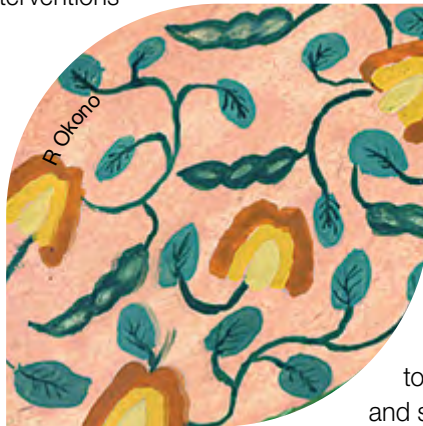
GCP is supported by several funders.

INTRODUCTION AND RATIONALE

GCP's capacity-building (CB) interventions primarily aim to enhance the application of molecular breeding, genomics, information technology and other new and emerging technologies in breeding programmes in developing countries by bridging human resource and infrastructure gaps. The rationale behind GCP's CB interventions is twofold: to build technical capacity for the efficient implementation of research, and to facilitate the flow of research products through the research-delivery continuum to intermediate and end users. In this respect, CB is crucial for the long-term sustainability of research, especially in developing countries.

The strategic objective of GCP's CB efforts is to build, in developing-country research institutes, a core of scientists who are trained in and exposed to the use of modern breeding tools. This, in turn, would enhance their involvement in global research initiatives, and enable them to competently take on research leadership roles. Tactical objectives are various: create a platform of

training resources on the application of advanced breeding technologies; cultivate research and learning opportunities for developing country programme scientists; construct systems for ensuring product delivery, including infrastructure support and development of communities of practice (CoPs); and implement various research support services.



At an operational level, the interventions also aim to: provide the targeted beneficiaries access to cutting-edge tools and services to efficiently manage and make sense out of the genotypic and phenotypic data generated from and by their projects; provide them with ongoing technical support in the use of these new and emerging tools; and identify and train local trainers to perpetuate the initial capacity-building interventions at local and regional levels.

About 12 percent (ie, a little less than USD 20 million) of the total GCP budget has been allocated to the CB activities described below for the duration of GCP's lifetime.

PROJECT ACTIVITIES AND OUTPUTS

1. Create a platform of training resources on the application of advanced breeding technologies:

For several years now, GCP has created a variety of digital and print learning resources on, for example, plant breeding concepts and methods, field management, phenotyping screening protocols, the application of markers in breeding, genomics and comparative genomics, drought phenotyping, genetic resources policies and design and analysis. Through both the GCP website and the Integrated Breeding Platform portal, GCP also provides access to learning resources and other CB opportunities developed by other institutions.

2. Cultivate research and learning opportunities for developing country programme scientists:

GCP has supported a large number of students taking formal postgraduate courses (35 for PhD and 8 for MSc at present). The intention is to prepare the next generation of breeders in developing countries, focusing on sub-Saharan Africa and South and Southeast Asia. The work conducted by supported students is tied to specific Research Initiatives (RIs), with field and laboratory work targeting defined project milestones and outputs. GCP has also implemented customised short courses and, as from 2012, has consolidated them into a comprehensive three-year programme. Targeted beneficiaries are breeders and other scientists from developing countries in Africa and Asia directly involved in molecular breeding projects, and the technicians working with them. This enhanced course covers molecular breeding strategies, data and information management, statistics and analysis, and the practical use of various informatics tools. GCP has also extended travel grants to many country programme collaborators, enabling them to attend important research meetings, workshops and symposia.

3. Construct systems for ensuring product delivery:

This includes support for infrastructure development – irrigation systems, greenhouses, weather stations and ICT equipment. Many electronic tablets for field and laboratory data collection were also distributed, after training on their use. This will increase accuracy between data capture and data analysis and save time. These interventions have enhanced the capacity of selected phenotyping field sites to conduct successful experiments and deliver quality phenotyping data. It has also included the participatory development of product delivery plans and the development and support of CoPs.

4. Implement various research and breeding support services:

GCP has invested in the development of various Breeding Services and Support Services to accelerate the adoption of modern-breeding methodologies, technologies and informatics tools by developing-country programmes. These services include a Genotyping Service, Phenotyping Sites and Protocols Service, Information and Data Management Service, Design and Analysis Service and IP and Policy Service. These have been implemented as part of the Integrated Breeding Platform (see the annexes of the Position Paper on IBP: *Annex 1 – Breeding information and Communities of Practice, Annex 4 – Data management service and Annex 5 – Breeding and support services*).



R Okono

UNIQUE FEATURES OF GCP'S CB INTERVENTIONS

- They are embedded in actual research work, so that the skills and knowledge acquired are implemented even as training proceeds
- Focus is on selected groups rather than broadly dispersed, thus providing intensive, sequential and cumulative training over a given period of time
- Hands-on training in using actual informatics tools and methodologies with the trainees' own, real-life, research data ensures that they work as they learn practical skills
- Post-training technical support facilitates use and application of skills learnt
- Establishment of communities comprising the learner groups facilitates ongoing interaction and peer-to-peer support, while the provision of breeding and breeding support services helps new users overcome technical and bureaucratic challenges.

Although this philosophy was applied broadly to all CB activities conducted by GCP, it was operationalised more concretely at the beginning of Phase II through the 'Capacity building *à la carte*' grants. GCP provided 14 such grants, each consisting of about USD 10,000 and made available to a small team for 18 months. Each grant supported diverse kinds of CB activities, specific to the demands and needs of the team in the context of the research they conducted with GCP.

An integral element of the CB effort is the Integrated Breeding Platform (IBP). This convenient 'one-stop shop' for crop information, breeding services and cutting-edge bioinformatics tools is accessible via a web portal. The Platform supports access to supplementary training materials and e-learning facilities, as well as to user-friendly, custom-built, informatics tools ready for immediate use after training. Technical back up in the use of both tools and services is also provided.

In quantitative terms, at GCP's sunset, outputs of CB activities will include more than 10 sets of learning resources in both digital and print form, well over 60 postgraduate students trained in modern breeding (see Annex), many beneficiaries of travel grants, more than USD 3 million in field-infrastructure improvements, 180 crop breeders and other scientists from developing countries trained in modern breeding through a series of comprehensive multiyear courses, numerous technicians with improved skills to ensure quality data from phenotyping trials, and several nascent crop CoPs.

MEASURING SUCCESS

The relevance and efficacy of GCP's CB effort are discernible in the shift in responsibilities of scientists from developing countries: they have moved from being research implementers in the Programme's early days to increasingly taking on active leadership roles in the Programme's later years. More than half of GCP's projects in Phase II are led by scientists from developing countries.

However, the CB effort faces the challenge of entrenched mind-sets and practices, which hinder the adoption and application of integrated breeding approaches. A GCP-funded offer for genotyping and/or fingerprinting was not as enthusiastically received as had been anticipated. Similarly, a cost-free opportunity to transfer research data into appropriate databases that would enable breeders to use the tools of the Integrated Breeding Workflow System met with only limited success, despite the availability of four experienced consultants to support data transfer and curation. Creating time to test new tools and provide development feedback is also a challenge for many collaborators.



While GCP provides post-training support for the application of skills learnt, the home institutes often lack a clear strategy for resource allocation and adjustment of systems to enable application of the skills learnt.

This contrasts with the private sector where the adoption of molecular breeding approaches has been accelerated by the firm commitment of management. Such commitment includes the allocation of requisite resources for services, and the recruitment of in-house staff to facilitate the adoption of these new technologies. These dedicated staff help breeders interpret their molecular data and choose the right approaches to advance their programmes.

POST-GCP SUSTAINABILITY AND PROJECTED IMPACT

SUSTAINABILITY

GCP's CB interventions are greatly valued by the collaborators with whom the Programme has worked, especially those in developing countries. Capacity building is a continuous process. Demand for CB interventions will continue – even grow – with the rise in awareness and the adoption of modern breeding. GCP efforts in recent years averaged USD 2 million per year, including the intensive Integrated Breeding Multiyear Course (IB-MYC), support for postgraduate students embedded in GCP's seven RIs, training of technicians working in the RIs, and the infrastructure support initiative. GCP has wholly funded most of these activities, as part of its 'evangelism' for modern breeding approaches.

The sustainability of CB products is variable, depending on the category they belong to. Documentation and knowledge, if embedded in suitable websites and/or institutions should remain sustainably accessible and usable. The CB efforts that provide research and learning opportunities for country programme scientists must be nurtured to be sustainable and relevant, with trained scientists maintaining some involvement in molecular breeding activities and probably also continuous training

activities. For field infrastructure, GCP invested mainly in basic equipment such as fencing, pumps, pipes and power generators, thus bringing selected experiment stations up to a minimum level to provide reliable and accurate phenotyping data. The maintenance cost of this equipment should be low if they are in regular use. GCP is exploring collaboration with regional organisations (eg, CORAF/WECARD) in Africa to develop sustainable plans to maintain and build on GCP's efforts in terms of human capacity and infrastructure development beyond December 2014.

Funds would be needed for further development, updating and production of learning resources and training courses. These funds may come from projects, funders, or fees that will eventually be charged for the tools and services of a platform like IBP. These courses and resources could be embedded in post-GCP breeding projects, but this may not happen, given differing priorities. Targeted beneficiaries and trainees will need to meet a significant portion of their costs, especially with the growing awareness of the value of molecular breeding in accelerating genetic gain. Where the Platform retains a philanthropic objective, as might happen with IBP post-GCP,

the fees charged for training may be only nominal, with most of the costs being met by 'richer users' (see the Position Paper on IBP for a proposed chargeback model).

The CoPs and professional networks that GCP is working to establish, if successful, could also play a pivotal role in sustainably addressing some post-GCP CB needs. This would essentially be through peer-to-peer support for troubleshooting, online discussion forums, and helping to build a question-and-answer resource. Both the CoPs and networks would also provide a good avenue for introducing and promoting new ideas and approaches to crop breeding and research.

IMPACT

Bottlenecks to the adoption of molecular breeding in developing countries include the shortage of well-trained personnel, inadequate high-throughput genotyping capacity, poor phenotyping infrastructure, lack of information systems or adaptable analysis tools, and simply resource-limited breeding programmes. Capacity building is therefore an absolutely vital step to enable scientists in these countries to access modern breeding.

In the past, GCP's CB activities involved various training workshops; capacity building *à la carte*, which

targeted specific needs of research teams; and fellowships and travel grants that targeted individual researchers or breeders. These approaches diffused efforts across a wide target group or area, retarding impact at specific target points that would have served more effectively as 'proofs of concept' that could then be emulated, adapted, enhanced and adopted on a wider scale.

Since early 2012, this approach was refined and enhanced through IB-MYC. This effort will lead to an accelerated adoption of modern breeding methods by the breeding programmes of targeted developing countries. Thus, improved varieties that are more productive and resilient would be more quickly released.

Considering the hands-on applied nature of GCP's CB activities, impact shall be measured according to concrete indicators 3–5 years after the Programme ends (see *the GCP Transition Strategy* for these indicators). On a relative scale of 1 to 5, where 5 represents the largest impact across all kinds of GCP products, regardless of activity or crop, and 0 no impact, GCP's efforts in CB are estimated to have an impact factor of 4 to 5. Such a high score indicates that CB is a 'must-have' to sustainably promote access and use of modern breeding in developing countries.

ANALYSING THE POST-GCP PLACEMENT OF THE CAPACITY-BUILDING COMPONENT

Capacity development is vital to ensure breeders understand how molecular breeding can accelerate their work and how they can implement it in their programmes. To ease the adoption process, molecular characterisation tools, accurate phenotyping and effective data analysis must be integrated with breeding workflows into efficient information systems that manage pedigree, phenotypic, genotypic and adaptation data.

WHAT WILL HAVE BEEN COMPLETED BY DECEMBER 2014

Significant achievements have been realised through GCP's CB interventions. The immediate objectives for this component can be estimated as being 80 percent achieved by the end of GCP's lifetime in 2014. However, these interventions address an ongoing need and growing demand for CB, particularly with the rise in awareness and adoption of modern breeding. The need and demand for CB towards integrating and using modern breeding approaches to increase country programmes' breeding efficiency will therefore not end in December 2014. Phasing it out without providing for its post-GCP continuation would lead to the gradual erosion of gains made in GCP's lifetime, and the still-birth of potential future gains.

EXTENDING ACTIVITIES TO CRPS, CENTRES OR OTHER INSTITUTIONS

All the CGIAR Centres undertake CB, but vary considerably in intensity and format. For some, such as Bioversity, CB comprises a significant proportion of their work, including the development of teaching and learning resources to support their CB interventions. Others focus on targeted interventions with their direct research partners, although regional Centres (eg, CIAT, ICARDA, ICRISAT, IITA) are more expansive in this respect. Some Centres have significant departments, sections or other institutional arrangements to facilitate CB, while others conduct CB within individual projects.

Few appear to have CB as a stand-alone intervention that is open to both research partners and other developing-country research institutions desiring such intervention with a focus on their particular mandate crops. As of today, the CGIAR Consortium has no strategy that offers general or skills-based CB that would have general application to all crop research and breeding work. However, discussions on such a CB strategy are beginning, revolving around knowledge sharing and data management.



Because those GCP research projects extending beyond December 2014 are embedded in different CRPs, logically, related crop CB activities can be expected to have a natural home in those CRPs, especially if they are entrenched in ongoing research work. These activities would be particularly ideal for formal postgraduate training programmes and infrastructure support. Plans for more generic and thematic CB activities may also emerge from ongoing discussions, to be coordinated at the Consortium level.

GCP has worked with many universities and research institutes, located in developed countries and not part of the CGIAR. Some may continue with those of GCP's CB efforts that have a more generic and thematic approach. For example, UC–Davis is active in training students in modern breeding, while Colorado State University and University of Nebraska–Lincoln offer courses on screening for drought tolerance. Some universities in the developing world have also expressed a wish to include GCP training modules in their master's degree curricula to reach scientists-in-training at an early stage.

These include the West Africa Centre for Crop Improvement at the University of Ghana and the Africa Centre for Crop Improvement at the University of Kwazulu–Natal.

GCP's CB efforts on technology and methodology, promoting access to generic information and best practices, can be continued after December 2014 through leading crop breeding universities, including Cornell, Iowa State (Raymond F Baker Center for Plant Breeding) and Illinois (Plant Breeding Center) in USA, Hohenheim in Germany and Wageningen in the Netherlands. These efforts may also be continued through platforms such as the IBP (should it survive in its current format), iPlant Collaborative and FAO's Global Partnership Initiative for Plant Breeding Capacity Building (GIPB).

EMBEDDING THE WORK IN A NEW ENTITY AS A RESEARCH ACTIVITY

A new purpose-built entity could be established with a mandate to carry on GCP's CB work, especially the more thematic CB related to IB–MYC. However, CB in the research and development arena generally relates strongly to a scientific context, being project-based or enabling people to access tools and technologies. To conduct CB in isolation would therefore not be as efficacious. If a potential new entity is to conduct any CB that will build on GCP's achievements, it would need to relate it to its own scientific purposes and objectives.

CONCLUSION

At its sunset, GCP will be concluding most of its ongoing, research-based, CB interventions. The few that will not be ending will have been effectively embedded in the CRPs. However, as already observed, CB is an ongoing need that should be met, even after GCP.

The key distinguishing feature of GCP's CB intervention is its incorporation of three essential content elements – molecular breeding, research data and information management, and statistics and analysis – within a single training programme, linked with ongoing research work. GCP merges this with skill-based training on specific tools and post-training support in the implementation of acquired knowledge and skills. This is boosted by the development of course-specific resource materials that can be made conveniently available in cyberspace. This integrated approach offers great value, especially when accompanied by the establishment of CoPs from each training cohort that can continue to provide peer-to-peer support.

The formal postgraduate training programmes would be best implemented by the Centres or

CRPs in collaboration with the appropriate universities or institutes offering these formal programmes. Thus, the benefits of linking these programmes with ongoing research projects for specific crops will be effectively maintained. The infrastructure support programme would also be best embedded in the Centres or CRPs, which are already appropriately positioned to identify priority national programme field sites for development and/or improvement. Such work would be most efficiently conducted in close collaboration with regional organisations such as CORAF/ WECARD in West Africa.

The embedding of CB components directly associated with research activities in the CRPs and other existing research-oriented initiatives may, or may not, however, address CB requirements that expressly enable scientists from developing countries to be exposed to and use modern



breeding as a new tool. If a pre-existing institution undertakes to address such requirements, it would need to establish processes to ensure the equivalent integration of all the elements as described. This may not be feasible or desirable. Hence, if the IBP were to survive beyond GCP's lifetime as a new entity, it could include an integrated cross-cutting CB programme that will



provide access to and support new breeding approaches for developing-country programmes, with suitable technical back up, building on CoPs and related networks.

A stand-alone assessment of GCP's capacity building objectives as defined at its foundation would indicate that the Programme has achieved its objectives. However, an assessment that includes the degree of need in developing countries would

most certainly indicate that the job is in fact just beginning – particularly considering the great promise and potential in the application of molecular markers to improve crop quality, resilience and productivity. In this latter respect, the work is therefore far from complete, though the foundation has been laid and significant progress has been made.

GCP remains committed to its mission and community to the end of the Programme and will work with partners along the delivery chain to maximise successful implementation of the delivery plans developed for each Research Initiative. GCP will also closely engage with its partners until its very sunset to ensure – as far as will be possible – the integration, extension, and expansion of activities, as may be required. The Programme will go a step further and help initiate related new activities that build on GCP's achievements, should there be clear added value and demand for such activities. In this way, the Programme is working to secure a broad and sustainable use of its products well beyond 2014, while also mitigating against the loss of gains made thus far.

ANNEX: SAMPLE OF POSTGRADUATE STUDENTS SUPPORTED BY GCP

(organised by country and then by alphabetical order of student's last name)

	Country, Student's name	Organisation	Course	Crop
Australia				
1.	C Douglas	DPI&F	Pre-doc	Chickpeas
2.	J Harris	ACPGF	PhD	Wheat
Bangladesh				
3.	Z Al-Shugeairy	UoA/BRRI	PhD	Rice
4.	A Bhuiya	BRRI/BAU	PhD	Rice
Benin				
5.	UC Okechukwu		PhD	Rice
Burkina Faso				
6.	J Batieno	INERA	PhD, WACCI	Cowpeas
7.	N Belko	INERA/CERAAS	PhD	Cowpeas
8.	H Kam	INERA	PhD	Rice
9.	A Konaté	INERA/UAC	PhD	Rice
Cameroon				
10.	M Nkoumki (mentored)	IRAD	PhD, WACCI	Cowpeas
China				
11.	L Du	CAAS	PhD	Wheat
12.	C Zhang	CAAS	PhD	Wheat
Ethiopia				
13.	F Alemayehu	EIAR/UFS	PhD	Beans
14.	A Asfaw	EIAR	PhD	Beans
15.	MJ Hedo	EIAR	PhD	Chickpeas
16.	M Jarso	EIAR	PhD	Chickpeas
17.	A Sori	EIAR	MSc	Chickpeas
18.	K Teshome	EIAR	PhD	Chickpeas
19.	G Tilahun	EIAR	MSc	Chickpeas
Germany				
20.	W Leiser	UoH	PhD	Genomics

ANNEX: CONTINUED...

	Country, Student's name	Organisation	Course	Crop
Ghana				
21.	J Adjebeng-Danquah	SARI-CSIR	PhD, WACCI	Cassava
22.	F Egbadzor (mentored)	SARI-CSIR	PhD, WACCI	Cowpeas
23.	BB Pephrah	CRI-CSIR	MSc	Cassava
24.	R Prempeh	CRI-CSIR	PhD, WACCI	Cassava
India				
25.	B Ammasidha	IARI	PhD	Wheat
26.	M Biswajit	IARI	PhD	Wheat
27.	H Krishna	IARI	PhD	Wheat
28.	T Leena	IARI	PhD	Wheat
29.	KC Prashant	IARI	PhD	Wheat
30.	KT Ramya	IARI	PhD	Wheat
Indonesia				
31.	W Enggarini	ICABIOGRAD	PhD	Rice
32.	J Prasetyono	ICABIOGRAD	PhD	Rice
Kenya				
33.	J Kaunyangi	EgertonU	MSc	Chickpeas
34.	AJ Kosgei	EASTC	PhD	Chickpeas
35.	M Oyier	EgU	MSc/PhD	Chickpeas
36.	S Songok	EgU	PhD, WACCI	Chickpeas
Malawi				
37.	A Chamango	CARS	PhD	Groundnuts
Mali				
38.	A Diarra	IER/UAC	MSc	Rice
39.	D Guindo	IER	PhD	Sorghum
40.	D Sako	IER	PhD, WACCI	Sorghum
41.	J Sangaré	IER/UAC	PhD	Rice
42.	M Tékété	IER	PhD	Sorghum
43.	K Théra	IER	PhD	Sorghum

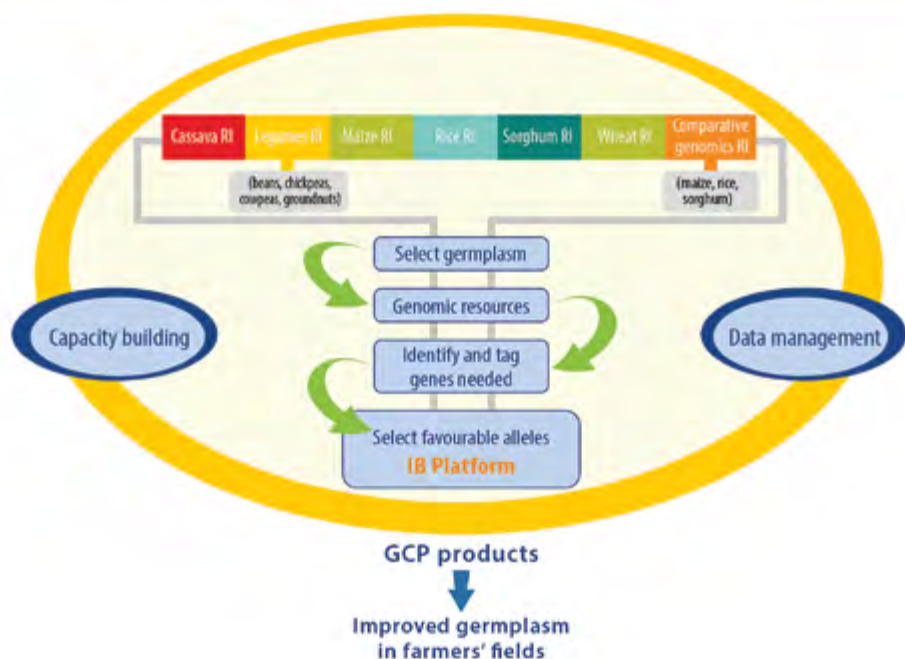
ANNEX: CONTINUED...

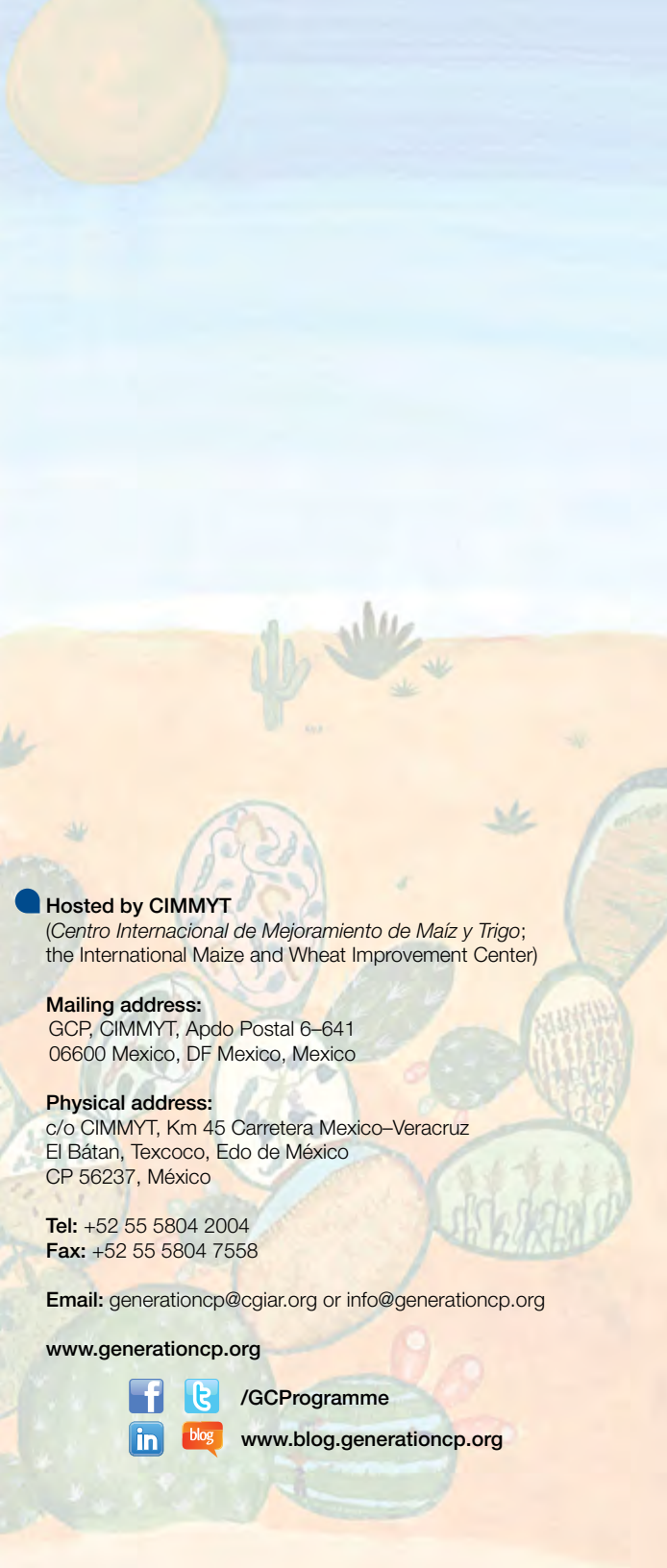
	Country, Student's name	Organisation	Course	Crop
	Mexico			
44.	E Villordo	INIFAP	PhD	Beans
	Mozambique			
45.	A Ndeve	UEM	PhD	Cowpeas
	Niger			
46.	O Halilou	ICRISAT/UAM	PhD	Groundnuts
47.	M Salifu (mentored)	INRAN	PhD	Cowpeas
	Nigeria			
48.	A Shaibu	NCRI/UoN, Nsukka	PhD	Rice
49.	B Olanami	NRCRI	PhD	Cassava
50.	ML Umar (mentored)	IAR	PhD, WACCI	Cowpeas
	Senegal			
51.	I Faye	ICRISAT/ISRA	Post-doc	Groundnuts
52.	MP Sarr	UCAD	PhD	Cowpeas
	Sri Lanka			
53.	M Munasinghe	UoA	PhD	Rice
	Tanzania			
54.	A Kijoji	SUA	PhD	Rice
55.	B Kimata	ARI-NRS	MSc	Cassava
56.	P Machambo	ARI-NRS	MSc	Groundnuts
	Uganda			
57.	W Esuma	NaCCRI	MSc	Cassava
	Zimbabwe			
58.	G Makunde	CBI	PhD	Beans

In 2011, GCP worked with more than 200 partners spread across 54 countries



GCP's Research Initiatives (RIs) and research support activities





Hosted by CIMMYT
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