



Generation  **Challenge programme**

For millennia, generations of farmers have known about – and used – plant genetic diversity. Farmers identify plants with particular traits, or plants that thrive in unfavourable conditions. Seeds and cuttings from these selected plants are carefully preserved for the next sowing season. This ancient and time-tested breeding strategy is now the root of novel plant science in our time.



Who we are

The Generation Challenge Programme (GCP) is one of five Challenge Programmes of the Consultative Group on International Agricultural Research (CGIAR). GCP is a broad network of partners from developing and developed country research programmes, collectively working at both the national and international level to increase crop productivity, particularly in drought-prone farmlands. GCP partners draw on plant diversity, and on existing and new technologies to improve crops with desired traits. Through this wide range of partners, GCP links basic science with applied research and helps to weave an effective and interactive community of crop researchers at both the global and regional level.

Why is plant genetic diversity important?

First, plant genetic diversity is obvious: for the same crop, some plants are tall and some short, some survive extreme climates, or are naturally pest-resistant. Deciphering the full set of the plant's genetic information – also known as the plant genome – reveals to us the exact factor responsible for these

differences. This knowledge is then used by crop breeders to generate better-adapted offspring (progeny).

Through the years, researchers have also used this knowledge to gather select genetic material from crops and their wild cousins, thus safeguarding these natural resources for current and future generations. This material is preserved in more than 1,400 'gene banks' – the custodians of genetic diversity. Yet, while these banks currently hold an estimated six million select samples, less than one percent has been used by breeders since there are no data or information on their *actual* application in breeding.

In Phase II (2009–2013), one of GCP's goals is to draw this diversity out of gene bank vaults, and apply it to improving plants today, in addition to continued collection and conservation for the future.

What is GCP's core business?

We selectively characterise the diversity of the most important crop germplasm for agriculture, including collections stored in gene banks under the custody of the CGIAR

as well as country research programmes. Using this diversity, GCP applies genomic tools and interdisciplinary approaches to better understand gene function and gene interactions. This understanding of gene systems across crops helps to identify and tag genes which contribute desired agronomic traits. Selection of favourable alleles (ie, variants) of those genes increases the efficiency, speed and scope of plant breeding.

GCP also integrates information components and analysis tools into a coherent information gateway and provides support for data storage and analysis. To ensure impact, GCP empowers scientists in developing country programmes to use modern breeding. In Phase II (2009–2013), our strategy emphasises product management and delivery as crucial cornerstones of GCP's work in the coming years: concepts and ideas at GCP founding are increasingly evolving into useful GCP products, and we remain committed to delivering practical and relevant products to boost breeding and, ultimately, have impact on crop productivity in farmers' fields. The main avenues to achieving this will be through delivery platforms and Challenge Initiatives (see inside pages).



Why GCP?

GCP's network helps to advance the frontiers of knowledge and develop practical tools such as molecular markers for desirable genes, so as to promote efficient field selection in plant breeding. Through our network of partners in the CGIAR, as well as in the public and private sector, GCP implements projects and programmes that bring together plant scientists from different disciplines to improve crops for the ultimate benefit of resource-poor farmers. GCP works with cutting-edge plant biology research partners, and augments the efforts of the CGIAR and the broader agricultural research-for-development community.

“Perhaps the most important value of GCP thus far, is the opportunities it has provided for people of diverse backgrounds to think collectively about solutions to complex problems, and, in the process, to learn from one another.”

– Excerpt from the report of the External Programme and Management Review, March 2008

Challenge Initiatives

GCP's Challenge Initiatives (CIs) were launched in 2009 in response to an External Programme and Management Review recommendation in 2008. The seven CIs are crop- trait- and region-specific:

Cereals

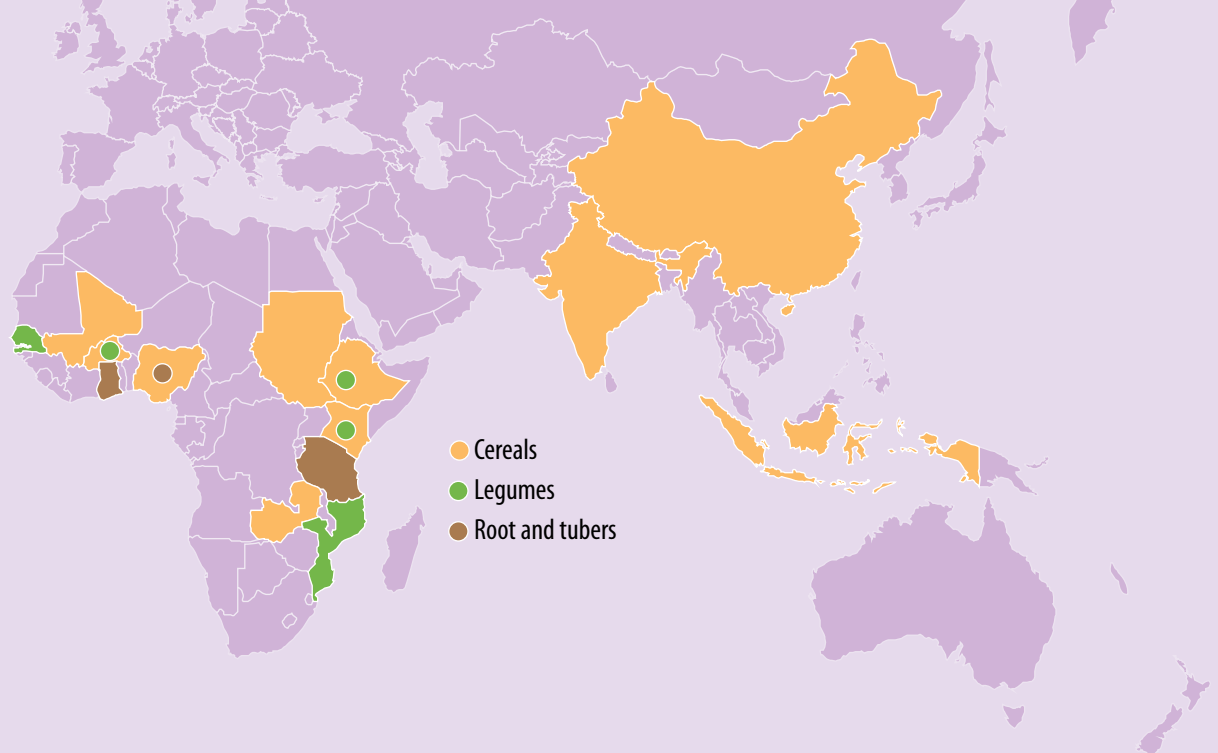
1. Improving drought tolerance in rice for Africa
Burkina Faso, Mali, Nigeria
2. Improving drought tolerance in wheat for Asia
China, India
3. Improving drought tolerance in sorghum for Africa
Ethiopia, Mali, Sudan
4. Comparative genomics to improve cereal yields in high-aluminium and low-phosphorous soils
Indonesia, Kenya, Zambia

Legumes

5. Improving drought tolerance in cowpeas for Africa
Burkina Faso, Mozambique, Senegal
6. Improving drought tolerance in chickpeas for Africa and Asia
Ethiopia, Kenya

Root and tubers

7. Improving cassava yield in Africa's drought-prone environments
Ghana, Nigeria, Tanzania

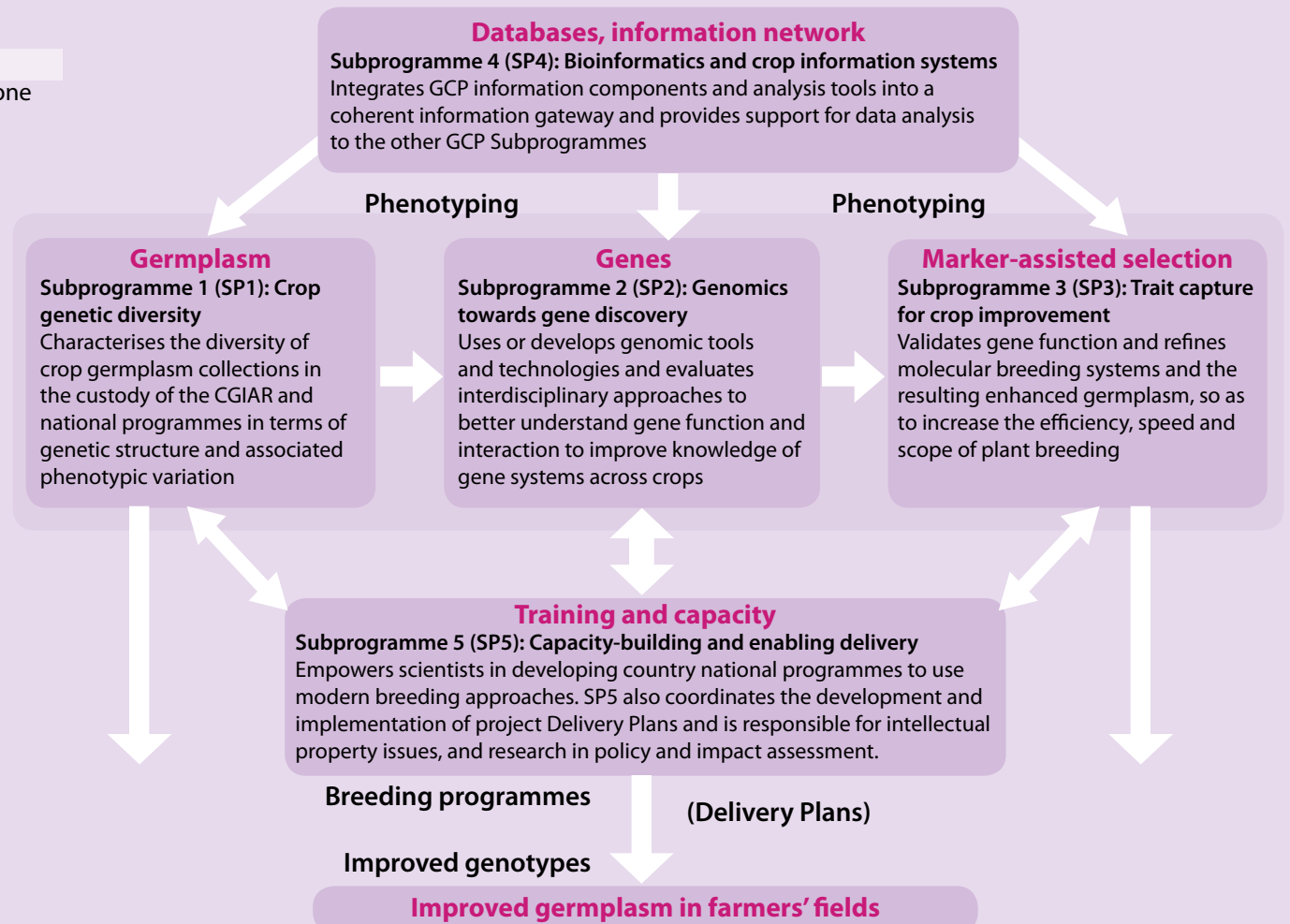


Delivery platforms

A major goal for GCP in early Phase II is to create a set of plant breeding support services as sustainable public goods. This will facilitate access by developing world breeders to modern plant science technologies at optimal cost and with logistical and technical support.

- **The Molecular Breeding Platform (MBP)** is geared to address specific needs identified by developing country breeders, and was launched in September 2009. It encompasses several breeding services which address germplasm, markers and traits. The services are all inter-related and complementary, but each component – or service – can also be used independently. Data management and access are critical pillars of the platform.
- **The Genetic Resources Support Service (GRSS)** supplies germplasm requested through the MBP above. GRSS aims at providing appropriate germplasm to support breeders. It is founded on the principle that any breeding programme needs to constantly or periodically monitor the genetic base of the programme, and broaden it by using the most appropriate resources.

GCP's five Subprogrammes



Where in the world is GCP? The GCP network in 2009

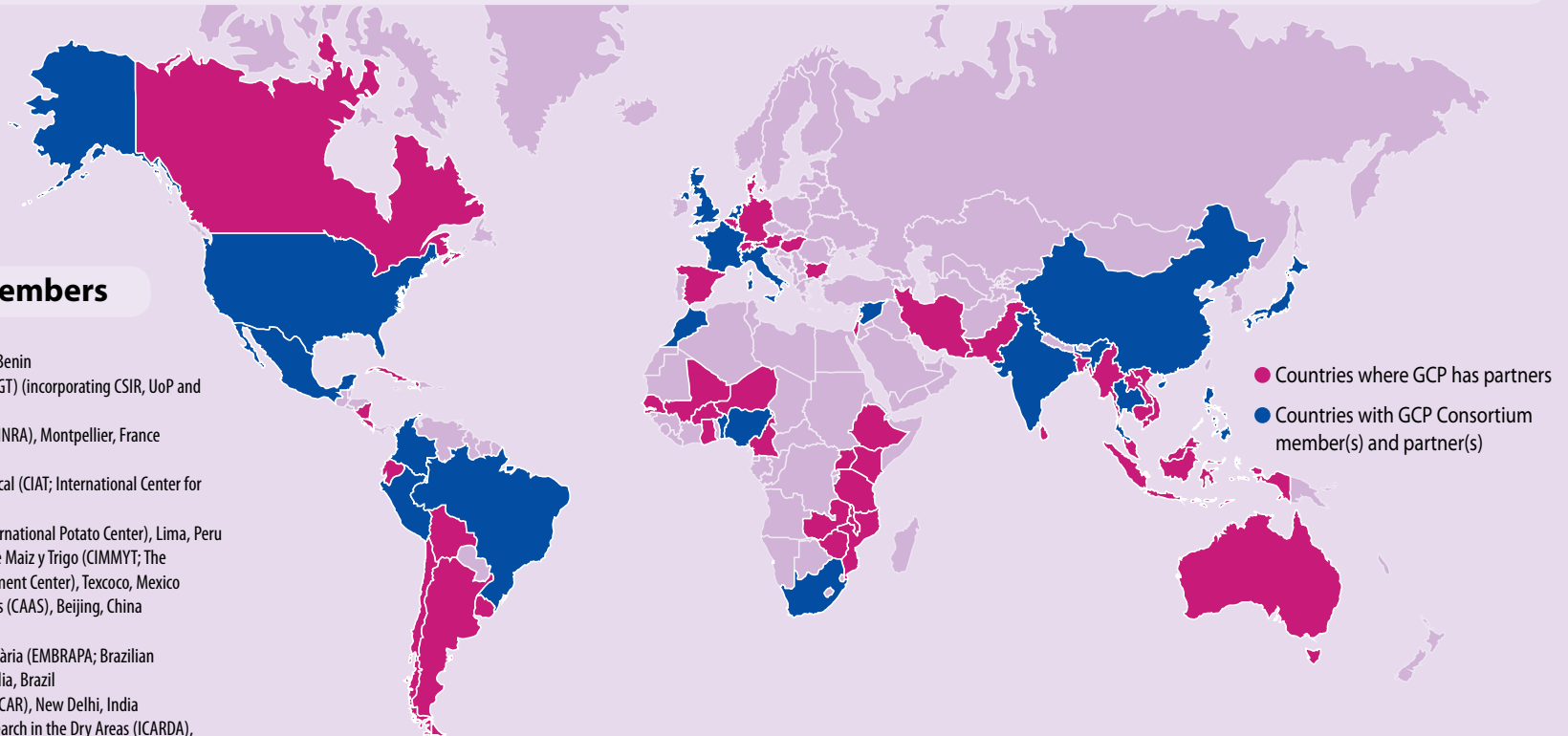
GCP Consortium members

Full members

1. Africa Rice Center (AfricaRice), Cotonou, Benin
2. African Centre for Gene Technologies (ACGT) (incorporating CSIR, UoP and UotW), Pretoria, South Africa
3. Agropolis (incorporating CIRAD, IRD and INRA), Montpellier, France
4. Bioversity International, Rome, Italy
5. Centro Internacional de Agricultura Tropical (CIAT; International Center for Tropical Agriculture), Cali, Colombia
6. Centro Internacional de la Papa (CIP; International Potato Center), Lima, Peru
7. Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT; The International Maize and Wheat Improvement Center), Texcoco, Mexico
8. Chinese Academy of Agricultural Sciences (CAAS), Beijing, China
9. Cornell University, Ithaca, New York, USA
10. Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA; Brazilian Agricultural Research Corporation), Brasília, Brazil
11. Indian Council of Agricultural Research (ICAR), New Delhi, India
12. International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria
13. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India
14. International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria
15. International Rice Research Institute (IRRI), Los Baños, The Philippines
16. John Innes Centre (JIC), Norwich, UK
17. National Institute of Agrobiological Sciences (NIAS), Tsukuba, Japan
18. Wageningen University and Research Centre (WUR), Wageningen, The Netherlands

Provisional members

19. Centro de Investigación y de Estudios Avanzados (CINVESTAV), Irapuato, Mexico
20. Institut national de la recherche agronomique (INRA), Rabat, Morocco
21. Istituto Agronomico per l'Oltremare (IAO), Florence, Italy
22. National Center for Genetic Engineering and Biotechnology (BIOTEC), Bangkok, Thailand



In 2009, GCP worked with more than 200 partners spread across 63 countries

Developing country partners

Central and West Asia and North Africa

1. Iran
2. Morocco
3. Syrian Arab Republic

Eastern Europe

4. Bulgaria
5. Hungary

Latin America and the Caribbean

6. Argentina
7. Bolivia
8. Chile
9. Colombia
10. Costa Rica
11. Cuba
12. Ecuador
13. Haiti
14. Nicaragua
15. Peru
16. Uruguay

South and Southeast Asia

17. Bangladesh
18. Cambodia
19. Indonesia
20. Laos
21. Myanmar
22. Pakistan
23. Sri Lanka
24. Vietnam

Sub-Saharan Africa

25. Benin
26. Burkina Faso
27. Cameroon
28. Ethiopia
29. Ghana
30. Kenya
31. Malawi
32. Mali
33. Mozambique
34. Niger
35. Nigeria
36. Senegal
37. Tanzania
38. Uganda
39. Zambia
40. Zimbabwe

Newly industrialised country partners

Latin America and the Caribbean

41. Brazil
42. Mexico

South and Southeast Asia

43. China
44. India
45. Malaysia
46. Thailand
47. The Philippines

Sub-Saharan Africa

48. South Africa

Developed country partners

Asia

49. Israel
50. Japan

Europe

51. Austria
52. Belgium
53. Denmark
54. France
55. Germany
56. Italy
57. Spain
58. Switzerland
59. The Netherlands
60. United Kingdom

North America

61. Canada
62. USA

Oceania

63. Australia



Created by the CGIAR in 2003 as a timebound 10-year Programme, GCP's goal is to add value to crop breeding, targeting farmers in drought-prone and harsh environments. Through capacity-building and by assisting developing world researchers to tap into a broader and richer pool of plant genetic diversity, GCP strives to ensure that crops improved by cutting-edge science will reach farmers in the developing world.



Generation Challenge programme

CGIAR Generation Challenge Programme (GCP)
Hosted by CIMMYT

(Centro Internacional de Mejoramiento de Maíz y Trigo;
the International Maize and Wheat Improvement Center)

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