International consortium for advanced biology in Brazil

How can we share the most powerful biological research techniques with southern countries so as to cope with change?

Strategies involving high-throughput analyses of genomes and their expression, associated with functional genomics and phenotyping, are set to speed up considerably the characterization and exploitation of plant genetic resources. The scientific aim of the CIBA consortium is to explore the adaptive diversity of cultivated tropical species so as to create the varieties best suited to the prevailing biotic and abiotic constraints. To this end, it is pooling top-level knowledge, skills, scientific resources and plant material collections.

**Partners**

**Brazil**
- **Embrapa** > Genetic resources and biotechnologies (CENARGEN), cotton and rice (CNPA, CNPAF), cassava and fruits (CNPMF), Cerrados (CPAC), Eastern Amazon (CPATU).
- **Federal University of Lavras** (UFLA).
- **State University of Santa Cruz** (UESC).
- **Luiz de Queiroz Agricultural College** University of São Paulo (ESALQ/USP).

**France**
- **Agropolis international**
- **IRD** > Joint research unit: RPB
- **INRA** > Joint research unit: AGAP
- **CIRAD** > Joint research units: AGAP and RPB; Internal research unit: Pests and Diseases, AIDA and BioWooEB.

**Funding**

- **France** > Agropolis Foundation; French Embassy in Brazil; CIRAD; Comité français d’évaluation de la coopération universitaire et scientifique avec le Brésil (COFECUB).
- **Brazil** > EMBRAPA; Higher Education and Training Coordination (CAPES); National scientific and technical development council (CNPq); Bahia State research support foundation (FAPESB);
- **São Paulo State research support foundation (FAPESP)**; Coffee R&D Consortium.

**Associates**

- **Africa** > Research institutes: IRAD (Cameroon), CRDPI (Congo), CERAAS (Senegal), University of Antananarivo, ESSA Forêt (Madagascar).
- **Latin America** > CATIE (Costa Rica), IBONE (Argentina), Brazilian States and public universities.

**Beneficiaries**

- **Brazilian farmers** (rice, coffee, cocoa, etc) have new varieties, founded on broader genetic bases.
- **Brazilian, European and African research organizations** can produce and test plant material and working populations (coffee, cotton, sorghum, rubber tree, etc).
- **Students, future management staff and researchers** in the consortium benefit from exchanges and knowledge sharing.
- **Collaboration between Europe, South America and Africa** is easier, in terms of both scientific projects and certificate and non-certificate training.
Expertise and technical skills

- Pre-breeding: identification of worthwhile characters, genome segments or genes in existing planting material; transfer of populations suitable for use in crop improvement to create varieties tailored to specific requirements.
- Development of markers, characterization of populations, genetic mapping.
- Structural genomics, comparative genomics, functional genomics, metabolomics, genotyping, phenotyping.
- Gene validation, genetic transformation, DNA, RNAi and RT-qPCR analyses.
- Study of specific crops: banana, cocoa, coffee, citrus, cotton, eucalyptus, oil palm, rice, sorghum, «rubber tree, etc.
- Identification of agronomic traits of interest related to biotic and abiotic constraints.
- Organization of training courses (students, researchers), for instance in bioinformatics.

Some current projects

In 2015, 30 projects are under way, co-funded by French and Brazilian donors.

**Fostering exchanges and synergies • CAPES, Brazil; Agropolis Fondation, France**

Coffee genetic diversity and drought tolerance (2013-2014); association for the study of the diversity of Ethiopian Coffea arabica germplasm (2014-2015); cocoa genomic breeding for productivity and resistance (2014-2016); influence of the genotype-environment interaction on mandarin quality (2013-2016); impact of water constraints and mineral flux on genome expression and wood formation (2013-2016).

**Developing a research platform to improve tropical tree crop species • CNPq, Brazil**

Strengthening of the “omics” platform at the University of Santa Cruz (UESC) for tree crop protection (2013-2016); exploiting genotype-environment interactions to improve citrus fruit quality (2013-2015); effects of water stress and potassium and sodium fertilization on growth and wood formation and quality in Eucalyptus grandis (2013-2016).

**Strengthening pest resistance in cocoa and cupuaçu • CAPES, EMBRAPA, FAPESB, Brazil**

Genomics of the interactions between hosts of the genus Theobroma and Moniliophthora perniciosa, which causes witches’ broom disease: functional studies with a view to improving cocoa and cupuaçu (Theobroma grandiflorum) (2011-2014); development of populations for cocoa improvement as regards frosty pod rot (2013-2016); selection based on large-scale genotyping of cocoa trees that are sources of resistance to witches’ broom and black pod (2013-2016).

Working together for tomorrow’s agriculture

CIBA, International Consortium for Advanced Biology

In 2015:
7 CIRAD researchers in Brazil,
15 in Montpellier, numerous Brazilian researchers plus teaching staff, 27 students (Masters or PhD), 71 papers presented at symposiums,
20 articles in international scientific journals.

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For further information
CIBA organizes a thematic workshop each year: CIBA 2013:
http://www.ciba2013.net/
CIRAD Regional Office
http://bresil.cirad.fr/
A platform is,
a set of partners keen to work together, shared prospects and objectives, a commitment in terms of human resources, equipment and funding, a shared research topic, a specific geographical field, a range of skills and activities.

www.cirad.fr