



INTERNATIONAL COFFEE GENOME NETWORK (ICGN)

<http://www.coffeegenome.org>

WHAT IS THE ICGN?

ICGN is a scientific network focused on building the foundation for **advancing agricultural research for sustainable coffee production worldwide**. Our main goal is to sequence the coffee genome and develop genomic tools and resources to further our **understanding of the coffee genome and its diversity** at the molecular, biochemical, and physiological levels.



WHO ARE OUR MEMBERS?

ICGN networks scientific groups from universities, research institutes, and industry within coffee producing and consuming countries, including more than 50 individual and Institutional members **from Africa, America, Asia, and Europe**

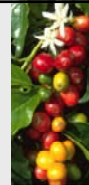


ICGN meeting in conjunction with the 22nd ASIC International Conference on Coffee Science in Campinas, Brazil, September 16th, 2008



Participating Research Institutes/ Countries (27) (19 coffee producing countries)

**Brazilian Consortium for Coffee Research/ EMBRAPA (Brazil),
CENICAFE (Colombia), PROMECAFE/ CATIE (Costa Rica,
Guatemala, Salvador, Honduras, Costa Rica, Panamá,
República Dominicana, Jamaica)
CCRI/CCMB/CBC/CFTRI (India),
CRF/CABI Regional Center (Kenya),
EARI + Addis Ababa University (Ethiopia)
ISAR (Rwanda)
CORNET (Ethiopia, Kenya, Uganda, Tanzania, Congo DRC,
Rwanda, Burundi, Madagascar)
Cornell University + HARC/UIUC + AGI + BTI (USA)
IRD/CIRAD/ENSAM, Nestle R&D Tours (France),
University of Trieste/ Illycafe/ ENEA (Italy)
University of Bohn (Germany)
Sweedish Agricultural University (Sweedeen)
Bioversity International**



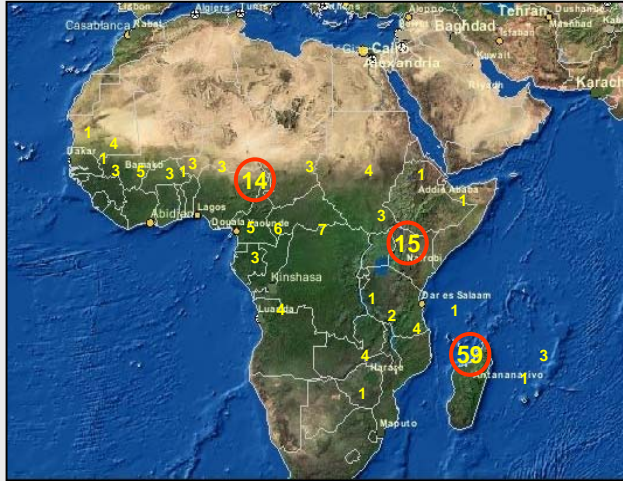
WHAT ARE OUR GOALS AND MISSION?

ICGN is committed to decipher the genetic and molecular bases of important biological traits in coffee tree species that are relevant to growers, processors, and consumers.

This knowledge is fundamental to allow efficient use and conservation of coffee genetic resources for the development of improved cultivars in terms of quality and reduced economic and environmental costs.

COFFEE BIODIVERSITY

Considerable biodiversity exists in *Coffea* species (>100) and is largely unexploited in cultivated varieties



➔ 3 highly divers zones: Mt Cameroon, East Africa, Madagascar

Coffee-tree Diversity (size, ecological adaptation...)



C. arabica



C. macrocarpa



C. ambongensis

Coffee-tree Diversity

Examples of berry diversity



C. kapakata



C. sessiliflora



C. arabica



C. pseudozanguebariae



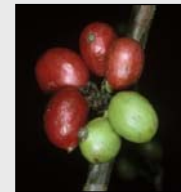
C. liberica var. dewevrei



P. mannii



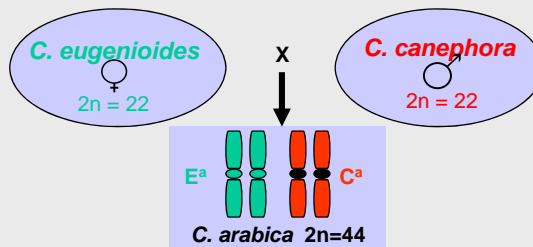
C. heterocalyx



C. canephora

WHY DO WE WANT TO SEQUENCE COFFEE GENOME?

- ✓ Genetic variation in wild coffee accessions is considerable and still largely unexploited in cultivated coffee varieties
- ✓ *Coffea arabica* is a recent allotetraploid species formed recently by the fusion of two diploid species



The complete sequence of the allotetraploid *C. arabica* (1,300 Mb) will be established using the 2 constitutive genomes *C. canephora* (800 Mb) and *C. eugenioides* (600 Mb)

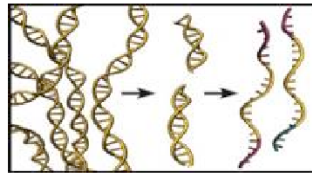
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COFFEE GENOME SEQUENCING

- ✓ The availability of next generation sequencing technologies
- ✓ Enhanced throughput and reduction of costs through the use of nanotechnologies

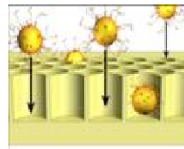
454 Process Overview



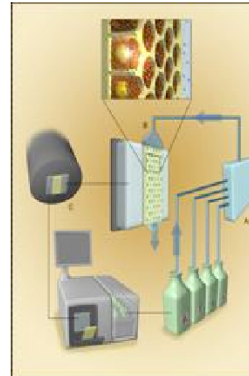
1) Prepare Adapter Ligated ssDNA Library



2) Clonal Amplification on 28 μ beads



3) Load beads and enzymes in PicoTiterPlate™



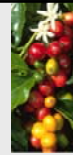
4) Perform Sequencing by synthesis on the 454 Instrument

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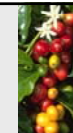
WHAT ARE THE BENEFITS FROM THIS ICGN INITIATIVE TO THE COFFEE SECTOR?

- Adapt state of the art genomic technologies for diversity characterization and conservation efforts in *Coffea* for enhanced utilization of *Coffea* germplasm resources in breeding programs.
- Ensure long term sustainable coffee production (from environmental, social, and economical point of views) in relation to climate change e.g. **Current vulnerability to biotic stress (insects and diseases) and abiotic stress (draught) due to lack of diversity of cultivated varieties.**
- Enhanced quality to increase consumer satisfaction and guarantee coffee supply (in term of quality/quantity/better prices for producing countries)



WHY DOES ICGN NEEDS BROAD BASE SUPPORT FROM ICO?

- This support is essential to give long term continuity to our international and multi-Institutional efforts and ensure broad base funding so that the information generated is available to the coffee scientific community worldwide.
- In particular, broad base support is needed for a global strategy for characterization, conservation and enhanced utilization of *Coffea* genetic resources.
- In addition, support is needed to facilitate networking, long term database maintenance, and stimulate inter-Institutional genomics research in coffee.



ICGN Meetings



*ICGN founding meeting Paris
April 4-5, 2005*

Founding meeting in Paris (2005), follow-up meetings in Trieste, Italy (April 28-29, 2006), and in conjunction with the ASIC Coffee Science Conference Montpellier, France (Jan 13-15, 2008), and Campinas, Brazil (Sep 14-19, 2008).

Next meeting will be at the ASIC Conference in Bali, Indonesia (Oct 3-8, 2010).

ICGN Coffee Genomics Workshops
Plant and Animal Genome Meeting (PAG)
San Diego, California, USA



San Diego, CA, January 10-14, 2009

Coorganizers

- Philippe Lashermes, Chair
ICGN, IRD/CIRAD France
- Rod Wing, U. Arizona,
PAG Organizing Committee
- Marcela Yepes, Cornell
University, Executive
Secretary ICGN

•The next Coffee Genomics Workshop will be organized by ICGN as part of the Plant and Animal Genome Meeting in San Diego, California Jan 15-19, 2011 (see <http://int-pag.org>)

