

Year of CfP: 2010

Project 1002-012

Project title: Phenotyping, Genotyping and analysing genetic diversity and structure of a collection of *Coffea arabica* from Ethiopia, in relation with quality and drought tolerance (PHEGECO)

Unit managing the project: AGAP Genetic improvement and plant adaptation (CIRAD, INRA, Montpellier SupAgro)

Project leaders: Leroy Thierry (thierry.leroy(a)cirad.fr)

Countries involved in the project: Brazil

Research units from the Foundation's scientific network involved: DIADE, QUALISUD

Subthematic axes: IPB-1 (Integrative Plant Biology 1: *Genetics and genomics, plant breeding, ecophysiology*)

Objectives:

Traditional coffee breeding has led to tremendous results in terms of productivity increase, and of tolerance to biotic/abiotic stress. However, the efficiency of conventional breeding is limited due to the perennial character of this crop, to its long juvenile period, and to the complexity of the genetic control of desirable traits which, for most of them, are polygenic, with high costs of characterization. Indeed, identifying molecular markers related to genes of interest would be extremely valuable, allowing major genetic gains for each selection cycle.

The phenotypic and genotypic characterization of this Ethiopian collection will constitute the start for the initiation of the mapping of genes or of markers of agronomic interest. Towards this goal two mapping techniques will have to be used. Studies will be initiated on the diversity and structure of this Ethiopian population, followed by mapping through linkage disequilibrium and association studies. Linkage mapping will be also based on the segregation of a biparental population.

Thus, keeping in mind the need for a better characterization of the existing diversity in *Coffea arabica*, with the use of mapping, this project aims at characterizing Ethiopian accessions phenotypically and genotypically regarding characters of quality and of drought tolerance. Within the duration of the project we assume we'll be able to:

- Evaluate in the field the phenotypic diversity of Ethiopian accessions in relation with quality and drought tolerance;
- Enhance our knowledge on the plasticity of a panel of contrasted accessions in controlled conditions, concerning phenotypic characteristics (morphology, anatomy, physiology) and molecular response (transcriptomics);
- Develop molecular markers, in line with analyses of the accessions;
- Start studies on the structure of the population with the aim of developing association studies;
- Contribute to the identification of specific molecular markers to be used in assisted selection (MAS) in *C. arabica* breeding;
- Train human resources in the fields of genetics and breeding with an experience in modern techniques of phenotyping, genotyping, and bioinformatics.

Total Agropolis Fondation funding: €19,978

Funding categorie(s): Work mission of professors, faculty members, scientists and/or researchers; Study missions for PhD students

Project duration: 01 April 2010 - 31 March 2013

Keywords: *Coffea*, diversity, Ethiopian accessions, molecular markers, phenotyping, genotyping