**Título: Evolução dos Genes MADS-Box no Café: Facilitadores para Adaptação Rápida face a mudanças climáticas?**

**Evolution of MADS-Box Genes in Coffee: Facilitator for Rapid Adaptation under climate change scenarios?**

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**Data estimada de início: Fevereiro 2020**

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**Enquadramento do tema e objetivos gerais:**

Climate change scenarios predict that most of our crops will be at increased risk in the future due to drought, high temperatures or enhanced CO2. Thus, there is an urgent need for strategies to mitigate this threat to global food security. Understanding the genetic bases underlying climate adaptation is a key element to forecast the potential of species to face climate warming. Here, we explore if MADS-box genes involved in the transition to flowering functions as a facilitator for rapid adaptation to changes in coffee. With more than 2.25 billion cups consumed every day, coffee (*Coffea* L.) is one of the most important crops on Earth, supporting a multibillion-dollar sector. Global coffee trade relies on two species: Robusta (*Coffea canephora*) and Arabica (Coffea arabica), which account for ca. 99% of coffee production worldwide. Despite this, genomic studies are still scarce and several gaps remain in knowledge of gene interactions and how expression varies with environmental stress.

Thus, our aim is to identify variations that control MAD-BOX genes in coffee, under a range of temperature and CO2 stresses, using our new sequenced transcriptomes. MADS-box genes are important transcription factors for plant development, and most especially for floral organogenesis and yield. This will enable the identification of genomic varieties associated with better yields, in current and future climate scenarios. The work is part of the BreedCAFS (BREEDing Coffee for Agroforestry Systems) project of the Horizon 2020 program. Funding and laboratory conditions are assured for the development of the proposed activities.

Key-words: Crop production, Environmental stress, coffee, genome.

**Título: Diversidade genética de espécies de café nativas de Moçambique: implicações para a sustentabilidade do setor cafeeiro**

**Genetic diversity of native coffee species from Mozambique: Implications for coffee sector sustainability**

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**Enquadramento do tema e objetivos gerais:**

Deforestation rates in tropical regions are among the highest in the world, with strong negative impacts on the environment. The implementation of the coffee crop under agroforestry system in the Gorongosa Mountains, Mozambique, aims at reconciling biodiversity conservation with human development through the consociation of native and coffee trees and to develop a sustainable model to produce fair trade, organic, certified, highest quality coffee.

Given the importance of coffee wild relatives for coffee sector sustainability, several critical questions come into focus: What is the extinction risk of wild coffee species in Mozambique? What is the level of genetic diversity within wild populations? What are the opportunities to introduce native coffee species in GorongosaCoffee blends? And which species should be prioritized for conservation and crop development? Thus, to provide insights into these questions, we propose to characterize population genetic diversity across several populations of *Coffea* spp. using microsatellite (expressed‐sequence tag simple‐sequence repeat; EST‐SSR) markers that will be developed from our new transcriptome sequenced data. We will also perform an initial assessment of cross‐species transferability of the microsatellite markers developed, as a tool for future studies on the genetic structure in *Coffea*. The work is part of the GorongosaCoffee Project (Produção Sustentável de Café na serra da Gorongosa em contexto agro-florestal integrado) funded by Camões, I.P. and by Agência de Cooperação Brasileira. Funding and laboratory conditions are assured for the development of the proposed activities.

**Key-words:** Crop production, coffee protection, wild relatives, conservation.