

The International Consortium in Advanced Biology presents:



Biotic and Abiotic Stress Tolerance in Plants: the Challenge for the 21st Century

BOOK OF ABSTRACTS

6 to 8 • NOVEMBER • 2013

Cana Brava Resort • Ilhéus - Bahia - Brazil

www.ciba2013.net

supports:



organizing institutions:



Institut de recherche
pour le développement

Workshop on Biotic and Abiotic Stress Tolerance in Plants: the Challenge for the 21st Century

Cana Brava Resort • Ilhéus-Bahia, Brazil • 6th-8th November 2013

S04T04

Molecular responses of coffee plants to drought stress

P. Marraccini^{1,2}, *N.G. Vieira*², *K.E Duarte*², *S.O Aquino*², *F.A. Carneiro*², *T.S. Costa*², *P.S. Sujii*², *F. Vinecky*², *J.C. Alekcevetch*², *G.S.C. Alves*², *T. Leroy*¹, *F. de Bellis*¹, *M.A.G. Ferrão*³, *F.M. DaMatta*⁴, *D. Pot*¹, *V.A. Silva*⁵, *G.C. Rodrigues*⁶, *A.C. Andrade*²

¹ CIRAD, UMR AGAP, Avenue d'Agropolis, F 34398 Montpellier, France

² EMBRAPA Recursos Genéticos e Biotecnologia (LGM), Parque EB, CP 02372, 70770-917 Brasília, DF, Brazil

³ INCAPER/EMBRAPA CAFE, Rod. BR 363, km 94, 29375-000 Domingos Martins, ES, Brazil

⁴ UFV, Departamento de Biologia Vegetal, 36570-000 Viçosa, MG, Brazil

⁵ EPAMIG/URESM, Rodovia Lavras/IJACI, Km 02, CP 176, 37200-000 Lavras, MG, Brazil

⁶ EMBRAPA Informática Agropecuária, CP. 6041, 13083-886, Campinas, SP, Brazil

Email : marraccini@cirad.fr

Drought is a key factor affecting coffee plant development and production. In the context of global warming, the generation of drought-tolerant coffee varieties has now turned into one of the priorities of many coffee research institutes. At the genetic level, it is well known that variability exists within the *Coffea* genus regarding the tolerance to drought-tolerant. During the last decade, several drought-tolerant clones of *C. canephora* Conilon have been characterized as vigorous plants with high productivity throughout years under drought stress. Physiological analyses suggested that drought tolerance could be a direct consequence of better root development or of enhanced activity of antioxidant enzymes. The recent advances in coffee genomics mainly expressed sequence tag (EST) sequencing projects now open the way to study the molecular and genetic determinism of drought tolerance and to the identification of molecular markers that could be used to speed up coffee breeding programs. With the aim to investigate the molecular mechanisms underlying drought tolerance in coffee plants of *C. canephora* and *C. arabica*, qPCR experiments identified more than 80 candidate genes (CGs) presenting differential gene expression between drought-tolerant and drought-susceptible clones/cultivars cultivated under different (with or without) irrigation conditions. Based on the results obtained in *C. canephora*, we concluded that factors involved a complex network of responses probably involving the abscisic (ABA) signaling pathway and nitric oxide (NO) are major molecular determinants that might explain the better efficiency in controlling stomata closure and transpiration displayed in drought-tolerant clones. In the drought-tolerant I59 cultivar *C. arabica*, many CGs involved in the signal transduction pathway of drought stress but also in the synthesis of several biochemical compounds (derivative-sugars etc...), were highly over-expressed under drought compared to drought-susceptible Rubi cultivar. We also identified several CGs that do not exhibit any similarity with those already deposited in global databases and commonly called "no hits". Recent concepts, called these "no hits" as "orphan genes" and postulate that the emergence of these are the result of adaptive responses specific to each species as a function of stresses and adverse conditions faced by these plants during the evolutionary process. This work presents data of expression profiles obtained for several CGs and some orphan genes (called *CcUnk* [Unknown]) and discussed their putative role in coffee responses to abiotic stress.

Work supported by CAPES-COFECUB, CIRAD, Consórcio Pesquisa Café and INCT-Café (CNPq/FAPEMIG).

S04T05

Genetic determinism of the growth dynamics in *Eucalyptus* according to environmental variation

Patrice This

Cirad UMR AGAP- France

S04T06

Banana breeding program at embrapa: challenges and opportunities

Edson Perito Amorim

Embrapa CNPMF-Brazil