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Sharing Advance in Coffee Science & Technology

FIRST STEP OF ABA PERCEPTION AND SIGNAL TRANSDUCTION IN COFFEE: EVOLUTIONARY AND EXPRESSION OF *PYR/PYL/RCARs*, *PP2Cs* AND *SNRK2s* GENES IN *C. canephora* UNDER DROUGHT

PB234

COTTA, Michelle G.[*,], RÊGO, Erica C.S.[**], BOCS, Stéphanie S.[***], COSTA, Tatiana S.[*,**], DUFAYARD, Jean-François[***], THIS, Dominique[***], MARRACCINI, Pierre[**,***], ANDRADE, Alan A.[**,****]**

[*]Federal University of Lavras, MG, Lavras, BRAZIL, [**]Embrapa Genetic Resources and Biotechnology, Brasilia, DF, BRAZIL, [***]CIRAD, UMR AGAP, Montpellier, FRANCE, [****]EMBRAPA Coffee-INOVACAFÉ, Lavras, BRAZIL.

Abstract:

Orthologous genes of *C. canephora* coding for the PYR/PYL/RCAR receptors, PP2C phosphatases and SnRK2 protein kinases of the tripartite system involved in abscisic acid (ABA) perception and transduction pathway were characterized. For several genes, differential expression profiles were observed between drought-tolerant (D^T) and drought-susceptible (D^S) clones of Conilon, indicating a key role of ABA in the genetic determinism of drought tolerance in coffee.

Introduction

ABA is a phytohormone coordinating plant responses to drought. The mechanisms of ABA perception and transduction involves receptors (PYR/PYL/RCARs) interacting with SnRK2 kinases and PP2C phosphatases (Fig.1). Genes coding these proteins were characterized in the genome of *C. canephora* (Fig. 2) and their expression was studied in roots and leaves of drought-tolerant (D^T: 14, 73 and 120) and drought-susceptible (D^S: 22) clones of *C. canephora* Conilon grown under drought conditions (M&M: see PB233).

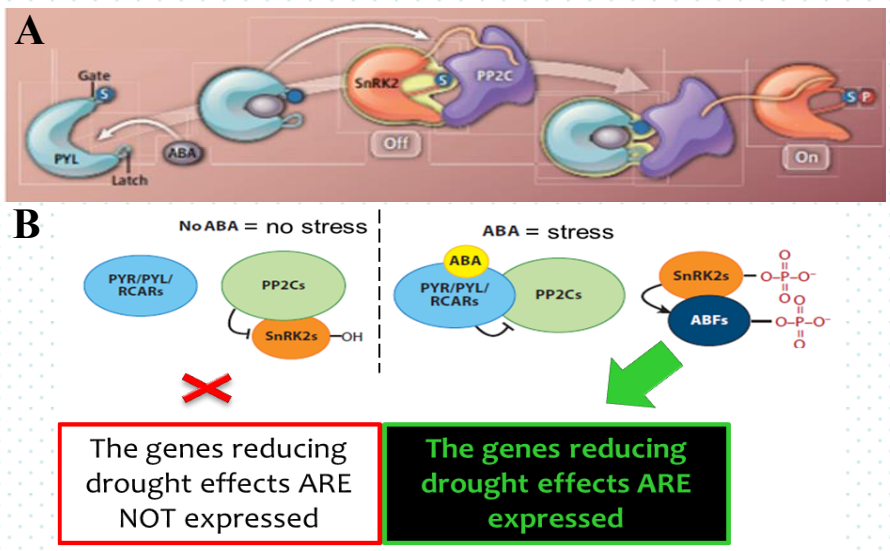

Figure 1: Tripartite system of ABA perception and signal transduction. (A) Schematic representation of the tripartite system. (B) Without ABA, SnRK2 kinases dephosphorylated by PP2Cs are inactive (left: system OFF). Under drought, ABA is fixed to PYR/PYL/RCAR receptors that interact with PP2Cs. Phosphotylated-SnRK2s then active are able to active genes in responses to drought (right: system ON).

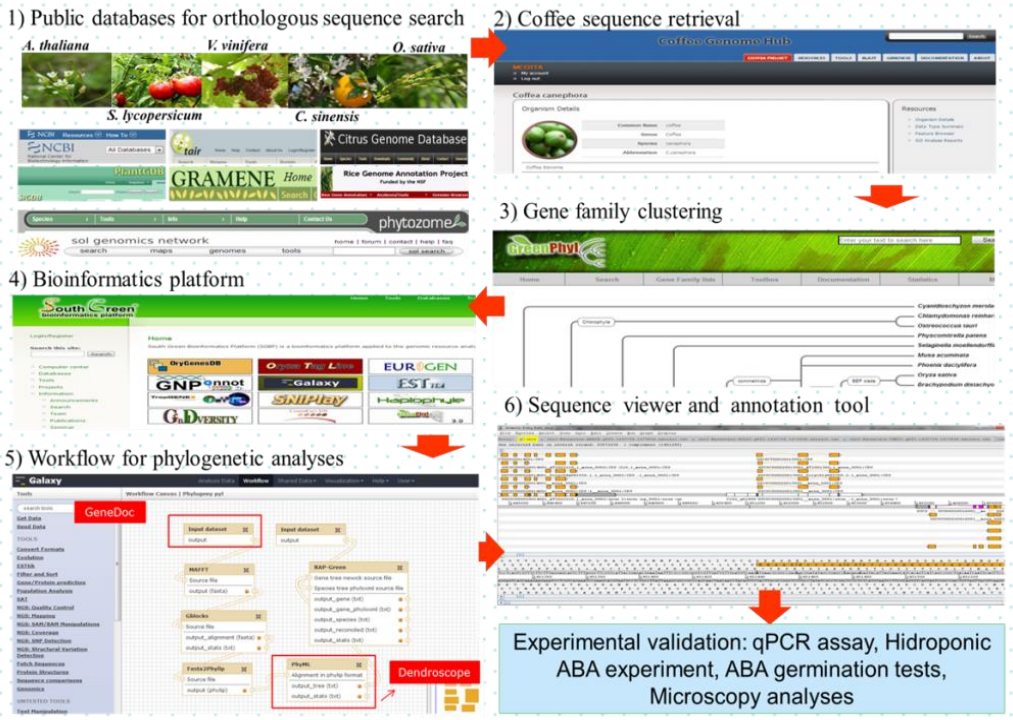

Figure 2: Workflow of bioinformatics analyses performed to identify *PYR/PYL/RCAR*, *SnRK2* and *PP2C* orthologous genes of *C. canephora*.

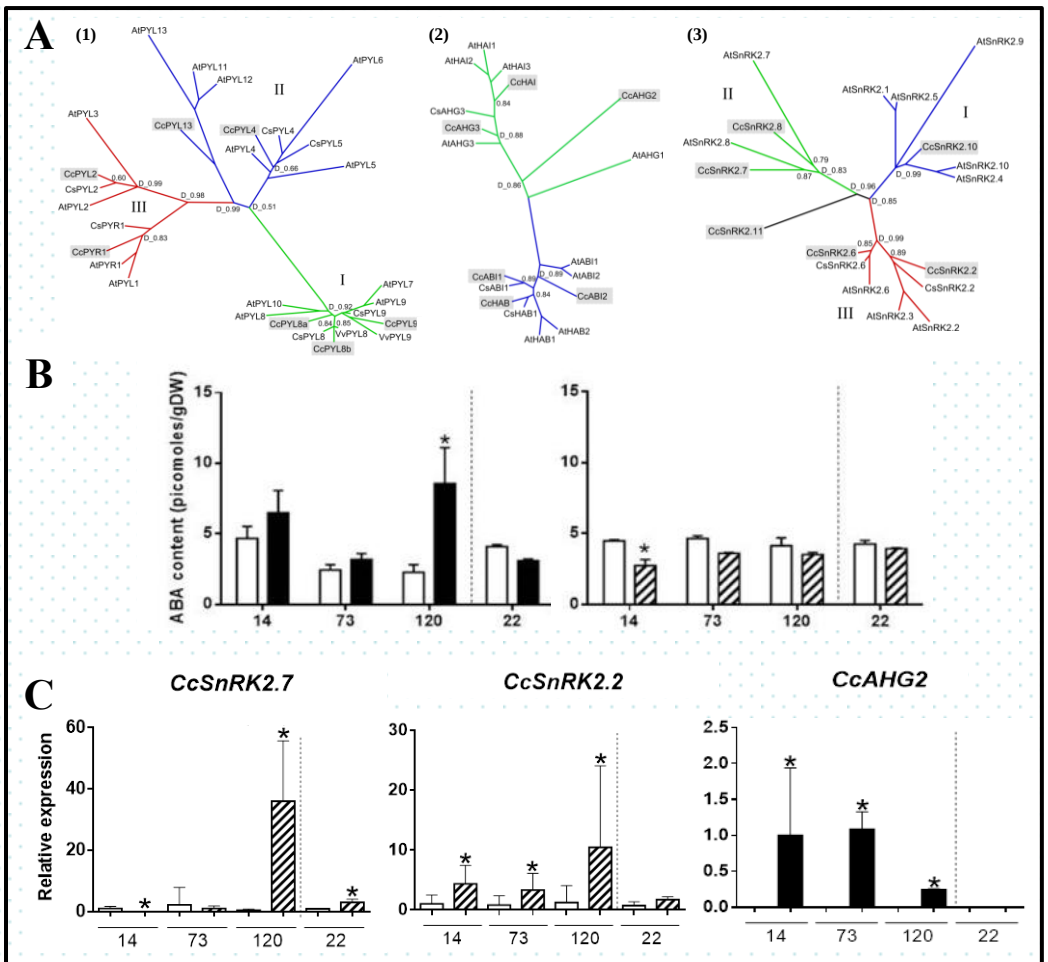

Figure 3. A: Phylogenetic analyses of PYR/PYL/RCAR receptors (1), PP2C phosphatases (2) and SnRK2 kinases (3). **B:** ABA quantification in leaves (left) and roots (right) of D^T and D^S clones of *C. canephora* Conilon grown under control (white isobars) or drought (black and dashed isobars). **C:** Expression profiles of *CcSnRK2.2* and *CcSnRK2.7* in roots and *CcAHG2* in leaves. Stars indicate significant differences.

Conclusions

- Twenty-four genes (9 *PYR/PYL/RCARs*, 6 *PP2Cs* and 9 *SnRK2s*) of the ABA tripartite system were functionally annotated in the genome of *C. canephora*.
- No significant differences of ABA contents were observed in roots and leaves (except clone 120), suggesting that D^T and D^S phenotypes of Conilon clones were probably due to altered ABA signalling pathway rather than deficiencies of ABA synthesis.
- Gene expression profiles clearly indicated the involvement of the ABA-dependent signalling pathway in the response of D^T and D^S clones of *C. canephora* Conilon subjected to drought.
- Different gene expression profiles were observed between D^T clones confirming the fact that different mechanisms are involved in the drought tolerance phenotypes in *C. canephora*.

UFLA UNIVERSIDADE FEDERAL DE LAVRAS · cirad · Consórcio Pesquisa Café · Montpellier SupAgro · COFECUB · CAPES · INCT CAFÉ INSTITUTO NACIONAL DE CIÊNCIA E TECNOLOGIA DO CAFÉ · Embrapa