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BOOK OF ABSTRACTS

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Study of circadian regulation of primary metabolism in coffee plant is key to develop coffee varieties adapted to climate change

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RATIONALE

The circadian clock (CC) is a critical regulator to optimize the plant physiology and metabolism to the correct time of the day, providing plants with the ability to anticipate daily and seasonal environmental changes. Plant transcriptome is massively modulated by the CC which is an integrator of many environmental cues. Through several experiments we show here how the CC of Arabica is modulated by the environment and how the genetic background can also modulate the CC with huge impact on primary metabolism.

METHODS

RNA sequencing was systematically used to study gene expression over 24h in combination with metabolomical and physiological analysis. Then we have integrated information of multiple circadian RNA-seq diurnal time-course in order to estimate the fraction of the Arabica transcriptome that is circadian regulated. Comparison of all the rhythmic genes identified in coffee genome with those of *Arabidopsis thaliana* revealed they are identical at almost 90%.

RESULTS

We present how photoperiod, full-moon light, and thermos-cycles, led to changes in transcript abundance of thousand of genes during the diurnal cycle altered the CC amplitude which in cascade modify the expression of thousand of rythmic genes. Moreover, we will explain how the genetic background can change the CC and the implication in terms of primary metabolism, physiological behaviour and disease resistance.

In this presentation we pay special attention to three major genes of the core clock for which we recall how important they are for the regulation of the transcriptome and *in fine* on the development of the plant and the major agronomic traits.

CONCLUSIONS & PERSPECTIVES

Variations in the environment and/or genetic background have a major impact on the rhythmicity and daily amplitude of expression of a large number of Arabica coffee genes. The same trends as in model plants (notably Arabidopsis) are found here.

The study of variations in the expression of the main core clock genes is fundamental and needs to be refined. A major question that needs to be addressed is: can we find allelic variation in circadian genes in the Arabica species and can we use it to breed news varieties with higher performances.

References:

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