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Transcriptome and biochemical analyses of diterpene synthases from *C. arabica* L.

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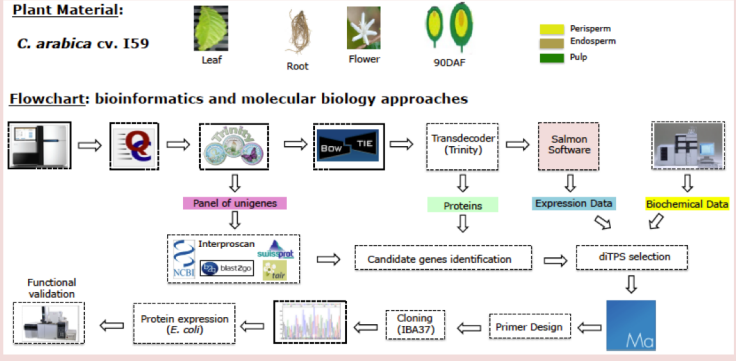
Introduction

Coffee bean composition is directly related to coffee cup quality and its nutraceutical properties[1]. *Ent*-kaurene is the substrate used for diterpenoid biosynthesis, such as cafestol (CAF) and kahweol (KAH), which are compounds exclusively found in coffee plants[2]. In this study, we identified and functionally characterized the diterpenes synthase (diTPS) genes involved in the middle step of CAF and KAH biosynthesis.

Materials/Methods



Results/Discussion

Diterpene biochemical profile and transcriptional activity pattern of diTPS genes were analyzed (Fig. 1). The best five candidate genes were selected for functional validation analysis using heterologous expression system in *E. coli* followed by *ent*-kaurene detection by GC-MS (Fig. 2). We discovered that *ent*-kaurene is produced by two distinct diTPS genes (Fig. 3).

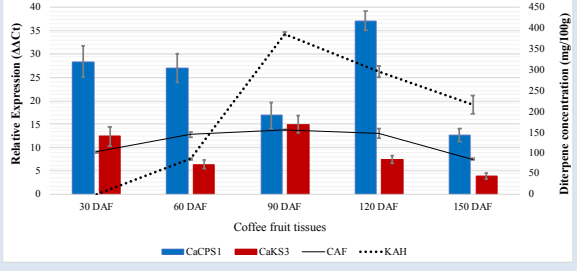


Figure 1: Diterpene biochemical profile and diTPS genes expression pattern in fruit tissues (30 to 150 DAF)

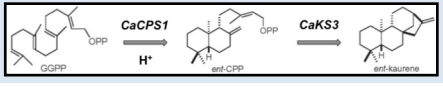


Figure 3: *Ent*-kaurene biosynthesis in *C. arabica* produced by *CaCPS1* and *CaKS3*

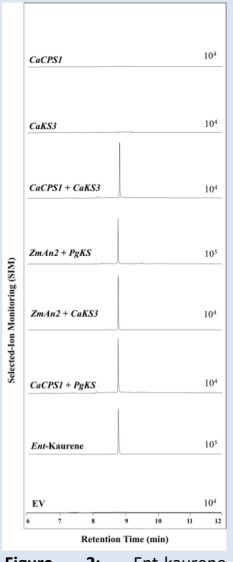


Figure 2: Ent-kaurene detection by GC-MS

Conclusion/Perspectives

Futher analysis is on going to unravel the genes involved in the final steps of CAF/KAH biosynthesis. In the future, our results will open the possibility to develop plants with desirable content of CAF/KAH and improve beverage quality focusing on human health.

References:

1. Karunanithi P.S. & Zerbe P. 2019. Frontiers in Plant Science. DOI: 10.3389/fpls.2019.01166.

2. Ivamoto S. T. et al. 2017. Plant Physiology and Biochemistry. DOI: 10.1016/j.plaphy.2016.12.004.