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Leaf sugar metabolomic profiling reveals differences between *Coffea arabica* cultivars in two locations of Cerrado Mineiro (Brazil)

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Rationale:
Brazil is the largest arabica coffee exporter, Minas Gerais being the state responsible for more than 50% of the Brazilian coffee production. In Cerrado Mineiro (Minas Gerais), coffee plants are often irrigated due to drought conditions, which could compromise coffee production. Besides, during drought conditions, sugar allocation, metabolism, and transport in plants are significantly affected. The objective of the present study was to analyze the sugar metabolism of five *Coffea arabica* L. cultivars in two distinct experimental areas of Cerrado Mineiro, with different irrigation conditions.

Methods:
The study was conducted in two experimental locations, Monte Carmelo and Patrocínio, in Cerrado Mineiro region. Five *Coffea arabica* cultivars (Catuaí Vermelho IAC 144, Catiguá MG2, MGS Catiguá MG3, MGS Paraíso II, and Sarchimor MG 8840) were selected for their drought tolerance. Expanded leaves were collected early morning and evaluated for: starch accumulation by spectrophotometry, and untargeted metabolomic analysis by GC-TOF-MS (splitless mode). Annotation of the metabolites was based on GOLM and KEGG metabolites databases. The statistical tests and pathway analysis were carried out by R software and MetaboAnalyst 5.0.

Results:
Starch content analysis revealed differences between cultivars and experimental location. Plotting PLS-DA with metabolic features (GC-TOF-MS, splitless mode) showed a separation of Catiguá MG2 from the other cultivars at both experimental locations. Volcano plots of the sugar metabolites that change significantly in amount between Monte Carmelo and Patrocínio, also disclose Catiguá MG2 cultivar with the largest number of up-regulated features (19/20). Six pathways were significantly impacted, wherein starch and sucrose metabolism excelled over the others.

Conclusions & Perspectives:
The cultivars showed differences in their sugar metabolism in both experimental locations. Notably, Catiguá MG2 recognized for its relative tolerance to drought conditions, stood out from the others. Further studies are needed to evaluate the contribution of these metabolites in coffee's tolerance to drought. These findings could potentially hold valuable implications for coffee breeding programs.

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