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Introduction

Coffee contains a variety of different organic acids (OAs) and chlorogenic acids (CGAs) that contribute to overall sensory properties like sourness and bitterness. Large variations in sample types and measurement methodologies complicate interpretation of general trends. Here we perform a meta-analysis of the literature to elucidate the concentrations of OAs and CGAs in coffee, across two species of coffee, *Coffea arabica* and *Coffea canephora* (robusta), for both green coffee and roasted coffee at multiple roast levels.

Materials/Methods

An extensive review of the scientific literature was conducted to identify peer-reviewed articles that reported experimental measurements of the concentration of any specific CGAs or OAs in coffee. Each sample was characterized as green or roasted, with the roast level further qualitatively denoted as light, medium, or dark based on a selection rule informed by how the publication described or quantified their roast levels.

Figure 1: Organic acids (g/kg) and chlorogenic acids (g/kg) in arabica coffee by roast level.

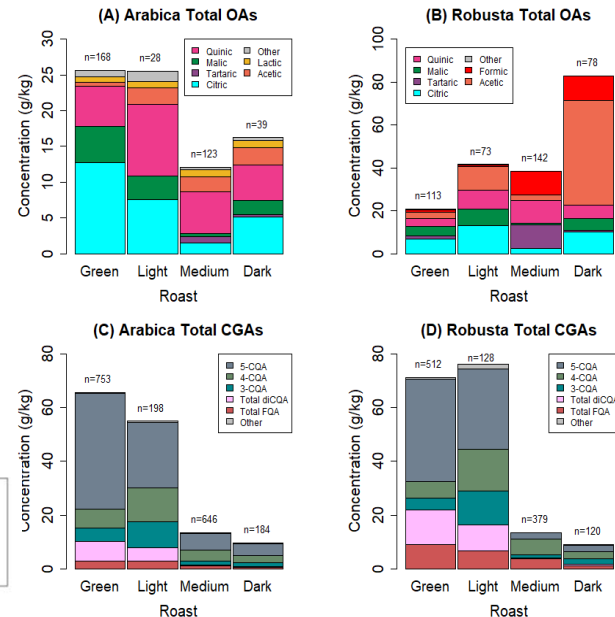
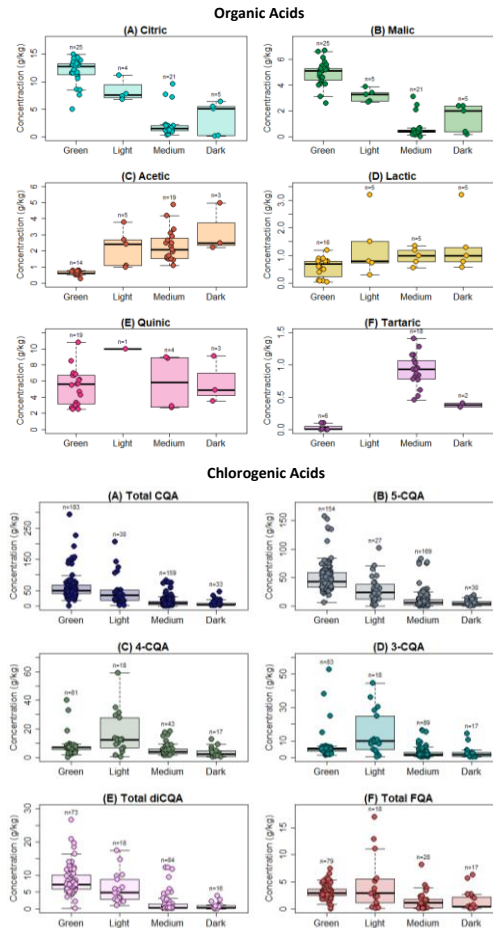


Figure 2: Comparison of arabica and robusta coffees for organic acids (g/kg) and chlorogenic acids (g/kg) by the sum of each median for each acid at that roast level. Subplot A and B are on different scales

Conclusion/Perspectives

Overall, this meta-analysis suggests that the increases in certain OAs with roast level, especially acetic acid, might play more of a role in the sensory profile of dark roast coffees than previously suspected.

Results/Discussion

A total of 121 different publications were found to report concentration measurements, yielding a total of 5,929 distinct acid concentrations. Analysis of the full data set reveals several trends. Notably, darker roast levels in robusta coffees are associated with a large increase in acetic acid concentration, such that acetic acid strongly dominates the total OA concentration. When looking at the relative proportions of acids in each coffee type, roasting too lightly or too darkly leads to an increase in particular OAs, which may affect the overall sensory profile of the beverage. When comparing green and roasted arabica or robusta coffee, the type of coffee will influence how particular OAs change with roasting. The different ratios of OAs could lead to different flavor profiles. As for CGAs, in both arabica and robusta coffee 5-CQA is the major component, and higher roast levels tended to sharply decrease the concentration of all CGAs. The total amount of CGA present was more dependent on roast level than the type of coffee (arabica vs. robusta).