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Brew temperature, at fixed brew strength and extraction, has little impact on the sensory profile of drip brew coffee

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Introduction

The brew temperature is widely considered a key parameter affecting the final quality of coffee, with a temperature near 93 °C often described as “optimal. There is little empirical evidence in terms of rigorous sensory descriptive analysis or consumer preference testing, however, to support any particular range of brew temperatures. In this study, we drip-brewed coffee to specific brew strengths, as measured by total dissolved solids (TDS), and extraction yields, as measured by percent extraction (PE), spanning the range of the classic Coffee Brewing Control Chart.

Materials/Methods

Coffees were brewed to three levels of total dissolved solids (1%, 1.25%, and 1.5%) and three levels of percent extraction (16%, 20%, and 24%) at three different brew temperatures (87° C, 90° C, and 93° C) for 27 coffee samples total. These were evaluated by a trained descriptive analysis panel to quantify how specific sensory attributes changed with brew temperature, TDS, and PE.

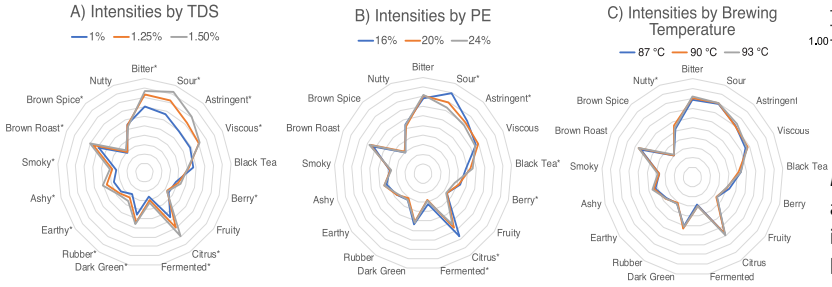

Figure 1. Spider web plots of attribute intensities by factor including (A) TDS, (b) PE, and (C) brew temperature

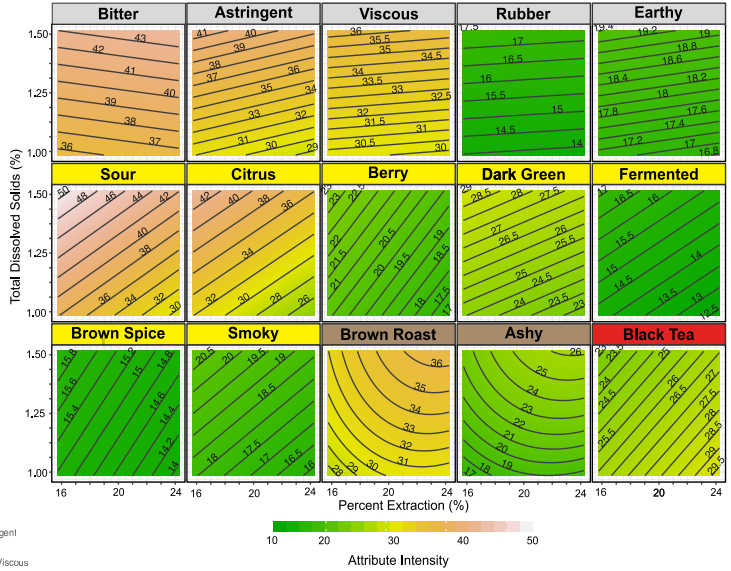

Figure 2. Response surface maps of all significant sensory attributes across TDS and PE

Results/Discussion

Surprisingly, as Figure 1 shows, brew temperature did not impact sensory properties of coffee at fixed TDS and PE. Temperature will impact the extraction, but if the extraction is modified by other means in brewing, temperature is not relevant to the flavor of the brew. TDS is the biggest driver of difference in the coffee sensory profile, followed by PE. With this in mind, we were able to re evaluate the classic Coffee Brewing Control Chart space by plotting response surface maps of all significant sensory attributes against both TDS and PE to predict sensory profile from extraction values. Figure 2 shows these plots, with attributes increasing by TDS and not changing with PE in grey, attributes increasing with TDS and decreasing with PE in yellow, increasing with both TDS and PE in brown, and decreasing with TDS and increasing with PE in red.

Conclusion/Perspectives

Within an appropriate range for hot brewed coffee, brew temperature has been shown here to not be an important factor compared to TDS and PE. These results allow industry to reimagine their brewing standards and expectations. Brewing at a lower temperature could potentially save energy in businesses brewing large volumes of coffee throughout the day, and lower temperatures reduce burn risk. TDS followed by PE are the more important factors for determining brew quality.

References: Batali ME, Ristenpart WD, Guinard JX. Brew temperature, at fixed brew strength and extraction, has little impact on the sensory profile of drip brew coffee. Sci Rep. 2020 Dec 1;10(1):16450.

Acknowledgements

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