

# Impact of superheated steam roasting process on the in-cup quality of espresso coffee brews

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## Introduction

Conventional coffee roasting uses hot air, HA, at temperatures between 150-260C. Superheated steam, SHS, with a high heating rate and low oxygen concentration is an interesting alternative for green coffee roasting. The effects of HA and SHS on the main quality parameters of ground coffee and espresso coffee brew, EC, were investigated.

## Materials/Methods

Coffee beans (Arabica, Blu Mountain) were roasted by HA and SHS (1) at 210C, 230C and 250C to obtain dark coffee. Roasted beans were ground and the particle sizes was quantified by using a laser granulometry (2). The powder was used to prepare espresso coffee samples, EC, which were analyzed for their main physical (aw, color, moisture) and chemical properties (moisture, TPC) including, also, the aroma profile by using an electronic nose, EC, (1). Total phenolic content was analyzed by using method by (3).

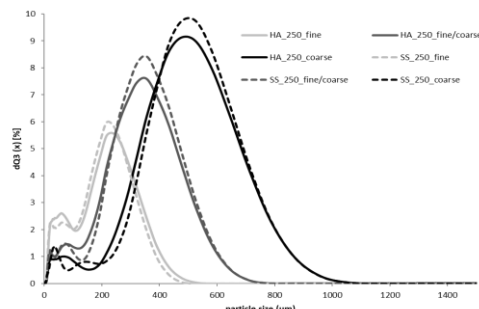


Figure 1: Particle size distribution of coffee powder

Sample	Crema volume (mL)	pH	Titration acidity (mL NaOH/mL EC)	Total solids (g/100g)	Soluble Solids (°Brix)	Total phenolics content (mg GAE/mL)
HA 210	3.125±0.629 <sup>a</sup>	6.508±0.019 <sup>a</sup>	0.043±0.002 <sup>1</sup>	5.366±0.013 <sup>a</sup>	4.80±0.10 <sup>d</sup>	3.78±0.38 <sup>a</sup>
HA 230	4.60±0.894 <sup>a</sup>	5.968±0.025 <sup>d</sup>	0.106±0.007 <sup>b</sup>	6.041±0.093 <sup>a</sup>	6.88±0.24 <sup>bc</sup>	5.48±0.31 <sup>cd</sup>
HA 250	4.20±0.447 <sup>a</sup>	5.76±0.007 <sup>a</sup>	0.142±0.011 <sup>a</sup>	6.363±0.511 <sup>a</sup>	7.60±0.17 <sup>a</sup>	6.91±0.18 <sup>a</sup>
SHS 210	3.50±0.707 <sup>ab</sup>	6.18±0.019 <sup>b</sup>	0.071±0.003 <sup>a</sup>	4.863±0.099 <sup>b</sup>	4.93±0.15 <sup>d</sup>	4.60±0.46 <sup>ab</sup>
SHS 230	4.50±1.000 <sup>ab</sup>	6.00±0.015 <sup>b</sup>	0.108±0.009 <sup>b</sup>	6.249±0.236 <sup>a</sup>	6.67±0.12 <sup>c</sup>	6.12±0.59 <sup>ab</sup>
SHS 250	4.083±0.665 <sup>ab</sup>	5.737±0.014 <sup>a</sup>	0.152±0.006 <sup>a</sup>	6.582±0.218 <sup>a</sup>	7.13±0.06 <sup>b</sup>	7.98±0.06 <sup>a</sup>

Table 1: Main physical and chemical attributes of EC samples, obtained from HA and SHS roasted beans

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## Results/Discussion

Particle sizes of the powder exhibited slight differences (between HA and SHS), <1% at the peak of the granulometric curve. EC samples showed an increase of pH, titration acidity, total and soluble solids as a function of roasting temperature while HA and SHS not affected such parameters. It is worth noting a higher total phenolic content for the beans submitted to SHS. The larger increase, from 7.98 mg (SHS) to 6.9 mg GAE/mL (HA), was observed at 250C. Preliminary data obtained by EC nose showed an overall difference in the aromatic profile for SHS.

## Conclusion/Perspectives

Super heated Steam is an interesting potential alternative for coffee roasting. It allows to reduce roasting time due to its heating rate and ability to penetrate into the beans. The experiments we conducted did not highlight significant difference between HA and SHS for the main chemical properties of the espresso coffee. On the other hands we observed a slight increase of total phenolics content and difference in the aromatic profile obtained by EC. Further sensory analyses are needed to better elucidate potential effect on the consumer's acceptance.

## References:

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