Determining the Impact of Roast Degree, Coffee to Water Ratio and Brewing Method on the Sensory Characteristics of Cold Brew Ugandan Coffee

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Abstract

- Despite the increasing prevalence of cold brewed coffee, little-published research exists on the factors that impact the sensory characteristics of cold brew coffee.
- The objective of this study was to determine the impact of a) degree of roasting, b) coffee to water ratio(C2WR) and c) brewing methods on cold brew coffee from d) Ugandan beans
- Four distinct coffee samples, sourced from different lowland and mountainous regions in Uganda, were roasted and tested using a factorial design that allowed comparison of all main factors (a-d) and their interactions
- A highly trained sensory panel of 5 evaluated cold brew samples based on 42 attributes from a previously published coffee lexicon
- Results showed that all aspects studied (Ugandan variety, roast degree, C2WR, and brewing method) had an impact on most of the sensory attributes
- However, although these aspects had an overall significant impact on the sensory characteristics, their effects were mitigated by the interactions
- For example, when Dark-roast Robusta with a C2WR of 8g/100 ml was steeped, it was more bitter than the corresponding Arabica samples, however, when the same Dark – roast Robusta with a low C2WR was slow-dripped, the Arabica and Robusta samples had similar bitter intensities
- Thus, although major aspects are critical, individual sample combinations must be considered when evaluating coffee samples for their impact on the sensory characteristics.

Practical application

Study suggests the need to develop a group of coffee "profiles" such as cocoa-like, fruity, dark chocolate-like instead of marketing Ugandan coffee as just "Arabica" or "Robusta" or with a cupping score.

Cold brewed coffee

Cold brew coffee is brewed using time to extract the aromas and flavors of roasted coffee grounds.

Materials and Methods

Green Coffee samples

- Wet processed Arabica (AW)
- Dry processed Arabica (AD)
- Wet processed Robusta(RW)
- Dry processed Robusta(RD)

Roasting degree

- Medium and Dark levels

Coffee to water ratio

- 8 g/100 ml and 12 g/100 ml

Brewing methods at 35° F

- Slow-dripping method

(**Figure 1:** Yama Cold Coffee Brewer, 32 oz.)

- Full-immersion method

(**Figure 2:** The Toddy Cold Brew System)

Panelists and Sensory Procedure

- A highly trained panel of 5 evaluated the cold brew samples basing on 42 attributes
- The Intensity scores for the attributes were based on a 0 – 15 point scale with 0.5 increments
- Four hot-brewed controls employed as scaled references during the sensory evaluation. (A)-Medium roast AW, (B)-Dark roast AD, (C)-Medium roast RW, and (D)-Dark roast RD
- The controls were brewed with a C2WR of 7g per 100 ml and served at 42°F, the same temperature as the cold brew samples



Figure 1: Dripping

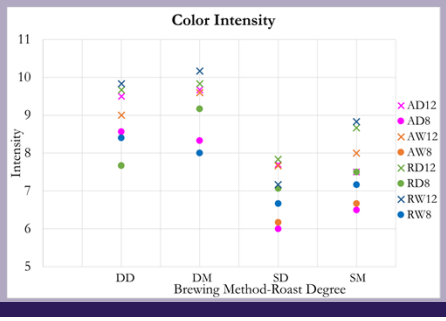


Figure 2: Steeping

Table 1: Intensity Scores for Color Intensity and Bitterness – Main effects only

Sample	Color Intensity	Bitterness
AW	7.85[b]	9.36[b]
AD	7.97[b]	9.24[b]
RW	8.28[a]	10.28[a]
RD	8.43[a]	10.08[a]
Roast		
Dark	7.91[b]	9.97[a]
Medium	8.35[a]	9.51[b]
C2WR		
C2WR12	8.79[a]	10.23[a]
C2WR8	7.47[b]	9.25[b]
Brew method		
Drip	8.94[a]	9.97[a]
Steep	7.32[b]	9.51[b]

Figure 3: Four-way interactions for Color Intensity
DD= Drip method-Dark roast, DM=Drip method-Medium roast, SD=Steep method-Dark roast, SM=Steep method-Medium roast



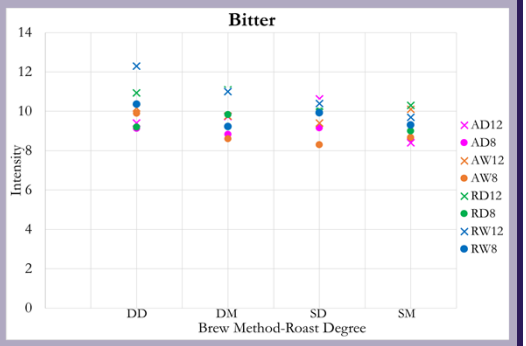


Figure 4 Four-way interactions for Bitterness
DD= Drip method-Dark roast, DM=Drip method-Medium roast, SD=Steep method- Dark roast, SM=Steep method-Medium roast

Results

- **Table 1** shows that the main aspects had impact on the sensory attributes
- Dark roast Robusta with a high C2WR that was brewed by dripping generally had higher intensities for most of the coffee-like attributes
- Medium roast Arabica samples with a low C2WR were generally more balanced/blended as compared to the Medium-roast Robusta samples with a high C2WR
- However, much as the main aspects were critical, their impact was mitigated by the interactions of these factors
- Almost all attributes with the exception of Coffee ID, and the flavors: Sweet, Stale, Musty/Earthy (both flavor and aroma), Floral, Burnt, Sweet Aromatics, and Ashy had significant four-way interaction of all aspects
- **Figure 3** shows that when Dark roast Robusta was steeped with a low C2WR, the color was darker than the corresponding Arabica samples but when the same samples were brewed using the slow-drip method, the Robusta and Arabica samples showed similar color intensity

Conclusion

It is critical to consider individual sample combinations when evaluating coffee samples for their impact on the sensory characteristics

Acknowledgement

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