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## Introduction

Coffee consumption increase 3.3% up to 170.3 million bags and given impact on Indonesia which occupies the fourth position as the world's main producer and exporter country by total production coffee reaching 794.8 thousand tons in 2022

Coffee is a popular commodity that has been cultivated in worldwide. Amongst several species of coffee, the major species cultivated in Indonesia are Arabica and Robusta. Another species available the least is Liberica

Coffee can have unique physical, chemical, and sensory characteristics influenced by various factors from farm to cup. One of the important factors in translating coffee beans into beverage is the brewing process.

Manual brewing had become popular nowadays, each brewing technique has different protocols to follow that may result in potential coffee brew characteristic of physical, chemical, and sensory difference

## Objective

This study aimed to investigate the influence of different manual brewing techniques on the physicochemical and sensory profiles of Arabica and Liberica Coffee.

## Material



*Coffea liberica*



*Coffea arabica*

Arabica and Liberica green coffee beans (natural process) were obtained from a coffee plantation in Kalipuro, Banyuwangi, Indonesia. Green coffee beans were roasted using WIA Giesen coffee roaster at medium level for further analysis.

## Methods



French Press



Vietnam Drip



V60

## Chemical Analysis

- Caffeine content was performed by HPLC (Shimadzu LC 20A) with C18 column
- Antioxidants content was analyzed by Diphenyl picryl hydrazyl (DPPH) to calculate IC50
- pH was analyzed by hand digital pH meter (ATC)

## Physical Analysis

- Total dissolved solids (TDS; expressed as % Brix) were analyzed using a VST Lab coffee refractometer
- Color Lightness (L\*) was analyzed using a color reader (Konica Minolta)

## Sensory Analysis

- Sensory analysis was conducted by using Quantitative Descriptive Analysis (QDA) method employing 8 trained panelists.
- Sensory evaluation and data collection were performed using RedJade Sensory Software

## References

- International Coffee Organization (ICO) 2021 World Coffee Consumption and Coffee Exporting Countries.  
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Molyneux P 2004 The Use of Stable Free Radical Diphenylpicrylhydrazyl(DPPH) for estimating antioxidant activity Journal Science Technology 26(2) 211-219  
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## Results & Discussions

### Roasted Coffee Beans

Parameters	Liberica	Arabica
Caffeine (%)*	0.95 ± 0.003	1.03 ± 0.007
IC <sub>50</sub> (ppm)	28.4 ± 0.001 <sup>b</sup>	33.8 ± 0.002 <sup>a</sup>
pH	5.4 ± 0.00 <sup>a</sup>	5.1 ± 0.00 <sup>b</sup>

Notes:  
• Data are presented as means ± standard deviation (n=3, except \*n=2).  
• Different notation indicates significant difference (t-test, α=0.05)

Different species may results in different coffee characteristic. Arabica and liberica differ on the IC50 and pH, where lower pH and higher IC50 was given by arabica than the Liberica

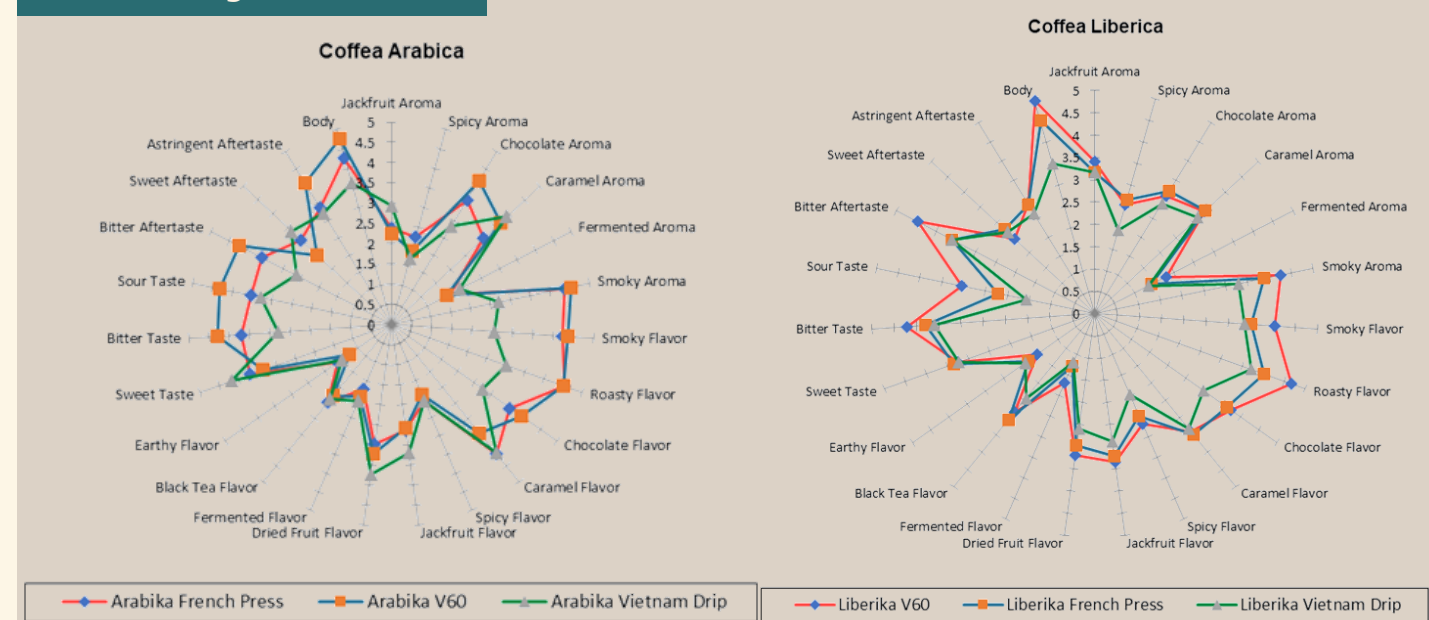
### Physicochemical Arabica and Liberica Brew

Sample	IC <sub>50</sub> (ppm)	pH	TDS (%)	L*
Arabica V60	12,95 ± 0.04 <sup>a</sup>	4.9 ± 0.06 <sup>b</sup>	1.8 ± 0.12 <sup>a</sup>	27.9 ± 0.37 <sup>a</sup>
Arabica French Press	34,93 ± 0.08 <sup>b</sup>	5.5 ± 0.06 <sup>b</sup>	1,4 ± 0.17 <sup>b</sup>	26.5 ± 0.50 <sup>b</sup>
Arabica Vietnam Drip	35,39 ± 0.02 <sup>c</sup>	5.2 ± 0.10 <sup>ab</sup>	1,2 ± 0.15 <sup>b</sup>	27.1 ± 0.62 <sup>ab</sup>
Liberica V60	13,03 ± 0.02 <sup>a</sup>	4.8 ± 0.06 <sup>b</sup>	1.8 ± 0.23 <sup>a</sup>	28.2 ± 0.40 <sup>a</sup>
Liberica French Press	22,70 ± 0.01 <sup>b</sup>	5.0 ± 0.06 <sup>a</sup>	1.5 ± 0.36 <sup>b</sup>	27.0 ± 0.45 <sup>b</sup>
Liberica Vietnam Drip	27,14 ± 0.02 <sup>c</sup>	5.1 ± 0.06 <sup>a</sup>	1.3 ± 0.35 <sup>b</sup>	27.3 ± 0.25 <sup>ab</sup>

Notes:  
• Data are presented as means ± standard deviation (n=3).  
• Different notation indicates significant difference (Fisher LSD, α=0.05)

- The V60 brewing technique had been found to produce coffee brew with higher antioxidant activity in both arabica and liberica
- The V60 technique produced the lowest pH coffee, where V60 use medium fine level, which is smaller than French Press and Vietnam Drip method
- The V60 technique has highest TDS significantly different from the French Press and Vietnam Drip. Smallest particle size used that created more surface area in contact when extraction process
- V60 coffee brew is the lightest color than another techniques. V60 the use of filter that may also filter out dissolved solids and melanoidins

## Sensory Profiles



V60 technique created the brew with higher intensity for aroma and smoky flavor, a roasty flavour, bitter and sour taste, bitter aftertaste, as well as body than the other techniques.

French Press technique generally has similarity of profiles like that of the V60.

Vietnam Drip showed the least complexity with overall lowest scores for all attributes.

## Conclusion

- Different manual brewing techniques (V60, French Press, and Vietnam Drip) influenced the physicochemical properties of the Arabica and Liberica coffee brew such as for pH, TDS, lightness (L\*), and antioxidant (IC50).
- The sensory profiles of Arabica and Liberica can be distinguished due to give more sweet-fruity related character of Arabica as compared to jackfruit, spicy, smoky, bitter notes of Liberica. The effect of different manual brewing technique was found to be more prominent in Arabica than in Liberica.