JTEP Jurnal Keteknikan Pertanian,
Vol. 14 No. 2, p 200-211, 2026
P-ISSN 2407-0475 E-ISSN 2338-8439

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

Research Article

OPEN ACCESS Check for updates

Characteristics of Lahat Robusta Coffee Cupping Scores Based on Natural Post-Harvest Processing

Ricky Rikardo[1], Dias Indrasti[1,2*], Dian Herawati[1,2]

[1]Department of Food Science and Technology, Faculty of Engineering and Technology, IPB University, Indonesia.

[2]South-East Asia Food and Agricultural Science and Technology (SEAFAST) Center, IPB University, Indonesia.

Corresponding author, email: d_indrasti@apps.ipb.ac.id

Article Info

Submitted: 10 January 2026
Revised: 25 April 2026
Accepted: 11 May 2026
Available online: 11 June 2026
Published: June 2026

Keywords:
Flavor, specialty coffee, sensory profile, R-grader, south sumatra

How to cite:
Rikardo, R., Indrasati, D., Herawati, D. (2026). Characteristics of Lahat Robusta Coffee Cupping Scores Based on Natural Post-Harvest Processing. Jurnal Keteknikan Pertanian, 14(2): 200-211. https://doi.org/*10.19028/jtep.014.2.200-211.*

Abstract

Robusta coffee from Lahat Regency, South Sumatra, is one of the leading commodities with quality potential that needs to be supported by proper post-harvest processing to achieve specialty (fine Robusta) quality standards. Natural post-harvest processing is known to form unique sensory characteristics through natural fermentation during drying. This study aimed to evaluate the cupping score characteristics of Lahat Robusta coffee based on natural post-harvest processing. Coffee bean samples were processed using the natural method to a moisture content of 10–11%, roasted, and evaluated using a cupping test by certified R-graders in accordance with Fine Robusta Standards and Protocols for the attributes of aroma/fragrance, flavor, aftertaste, salt or acid, bitter or sweet, mouthfeel, uniform cup, balance, clean cup, overall, taints-faults, and total scores. The results showed that Lahat Robusta coffee with natural post-harvest processing produced superior characteristics, with a final cupping score of 83.88, placing it in the specialty coffee category. The resulting sensory profile was dominated by the attributes of brown sugar, honey, dark chocolate, hazelnut, fresh fruity, acidic, nutty, cereally, and spicy. Natural post-harvest processing has proven to be effective in enriching flavor precursor compounds. Lahat Robusta coffee has the potential for regional authenticity and high quality. These findings can support the development of quality and strengthen the identity of Lahat Robusta coffee at the national scale.

Doi: https://doi.org/10.19028/jtep.014.2.200-211

1. Introduction

Coffee comes from the Coffea genus, is included in the Rubiaceae family (Banti and Atlaw 2024), has complex chemical components that act as precursors in flavor formation through the roasting process (Bolka and Emire 2020), making coffee a highly sought-after beverage (Herawati et al. 2022) that is universally accepted (Khapre et al. 2017). In Indonesia, the total area of coffee plantations reaches 1.27 million hectares spread across 36 provinces, with the largest plantation area being in

JTEP Jurnal Keteknikan Pertanian,
Vol. 14 No. 2, p 200-211, 2026
P-ISSN 2407-0475 E-ISSN 2338-8439
Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

South Sumatra province (267,435 hectares) or 20.99% of the national total, and the highest production is 219,586 tons, dominated by robusta coffee (76.88% of total exports) (BPS 2024). In the province of South Sumatra, the Lahat district is one of the largest centers of robusta coffee production. However, the popularity and added value of Lahat robusta coffee have not been optimized because of the limited literature and scientific information on the sensory profile and quality standardization of Lahat robusta coffee in building a brand identity regarding its unique taste and quality attributes to penetrate the specialty coffee market.

High coffee yields pose a challenge for farmers in producing high-quality and specialty coffee beans. Consistent and optimal post-harvest processing can maintain coffee quality (Gonzalez et al. 2019) with a maximum moisture content of 12.5% (Indonesian National Standard, 2008). Post-harvest processing of coffee plays an important role in preventing quality degradation and extending its shelf life (Zhang et al. 2023). In addition, natural post-harvest processing plays a role in influencing flavor precursors (Bastian et al. 2025), such as natural processing, which undergoes a natural fermentation process that can change the content and metabolism of coffee aromatic compounds (Banti and Atlaw 2024), and then influence sensory characteristics, especially the aroma profile of brewed coffee (Herawati et al. 2022).

The natural (dry) processing method is dominant in Robusta coffee (Guambi et al. 2024; Fibrianto et al. 2024). In South Sumatra Province, natural processing has become a local wisdom of coffee cultivation that has been passed down from generation to generation by the local community. Moon et al. (2025) reported that natural coffee processing can enhance the fruity flavor of esters. This is because, in natural processing, coffee beans undergo a natural fermentation process, where microorganisms produce compounds such as alcohol, esters, aldehydes, ketones, and acids, which can contribute to an increase in volatile compounds due to the breakdown of complex compounds into simpler ones, resulting in complex flavor compounds in green beans (Dharmawan and Sutedja 2025).

Coffee bean characteristics are assessed to determine the quality and sensory profile. Cupping scores are a quality assessment standard on a scale of 0–100. Defects in coffee beans significantly affect their chemical composition of coffee beans, which influences the Maillard reaction and determines the flavor profile of coffee (Fardenan et al. 2024; Bastian et al. 2025). The quality of robusta coffee is assessed using cupping scores based on the Fine Robusta Standards and Protocols using R graders (Hetzel 2011). There is a lack of studies linking natural post-harvest processing with the cupping score characteristics of Lahat robusta coffee from South Sumatra. Therefore, scientific evidence is needed to support the quality development and standardization of these products. Therefore, this study was conducted to characterize the cupping scores of Lahat Robusta coffee based on natural post-harvest processing. The results of this study are expected to provide a scientific basis for the development of post-harvest quality and standardization, as well as strengthening the identity and competitiveness of Lahat Robusta coffee at the national level.

JTEP Jurnal Keteknikan Pertanian,
Vol. 14 No. 2, p 200-211, 2026
P-ISSN 2407-0475 E-ISSN 2338-8439
Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

2. Material and Methods

2.1 Sample Preparation

Robusta coffee beans (Coffea canephora) were obtained from farmers in Genting Village, Tanjung Sakti Pumu District, Lahat Regency, South Sumatra, between June and July 2025. The natural coffee bean processing method involves drying red coffee cherries directly under the sun, resulting in coffee with a fruity flavor and cherry-like aroma. This drying process takes approximately 2–4 weeks until the moisture content reaches approximately 12% (dry basis), after which the parchment is removed using a hulling machine and packed in dark-colored high-density polyethylene (HDPE) bags equipped with one-way valves.

2.2 Cupping Score Analysis

The cupping score analysis was performed by certified R-graders at the Coffee and Cocoa Research Center (PUSLITKOKA) in Jember, Indonesia. Coffee samples were prepared by weighing 8.25 g of coffee and brewing it with 150 mL of hot water (92-93 °C). The brewed coffee was left to stand for 3-5 minutes until its temperature reached 70-73 °C. The scoring was carried out by 10 panelists, who recorded their scores and tasting notes on the provided forms. Cupping scores evaluate attributes such as fragrance, flavor, aftertaste, salt or acid, bitter or sweet, mouthfeel, uniform cup, balance, clean up, overall, taints-faults, and a final score based on all testing parameters, with a rating scale for each attribute ranging from 6.0–10.0. The total cupping score was summed and then categorized based on the obtained value: good (60–67.5), Very Good (70–77.5), excellent (80–87.5), and outstanding (90–97.5). Coffee must achieve a minimum score of 80 points to be classified as a specialty grade under the Fine Robusta protocol, and if the coffee score is below 60, it is classified as commercial grade (Hetzel 2011).

3. Results and Discussion

3.1 Cupping Analysis

Chemical components found in coffee, such as caffeine, trigonelline, lipids, sugars, and chlorogenic acid, play a role in forming sensory profiles, such as taste, aroma, or bitterness, during roasting (Oliva-Cruz et al. 2024). Roasting can produce various sensory profiles according to the roasting level, which is divided into three levels: light, medium, and dark. Light roasting produces high acidity, medium roasting produces a balanced taste, aroma, and acidity, and produces a thick body, whereas dark roasting produces a thick body and low acidity. Therefore, it is necessary to assess the quality and taste of coffee (Sulaiman et al., 2022). The quality of specialty coffee is determined objectively through formal sensory evaluation or cupping using the standards set by the fine robusta protocol. The characteristics of Lahat robusta coffee from South Sumatra with cupping scores are shown in Figure 1.

JTEP Jurnal Keteknikan Pertanian,
Vol. 14 No. 2, p 200-211, 2026
P-ISSN 2407-0475 E-ISSN 2338-8439
Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

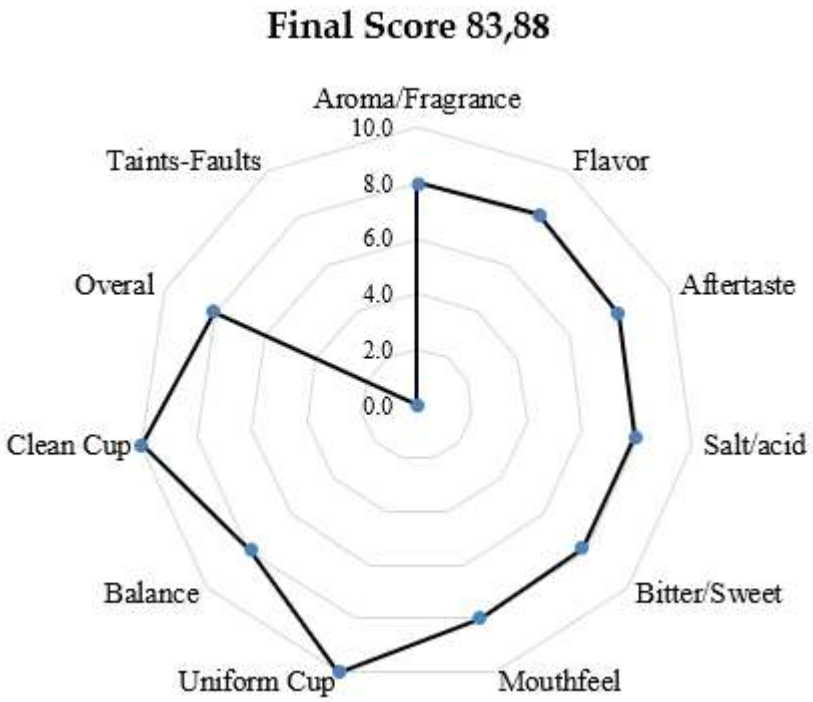

Figure 1. Robusta coffee cupping scoring system.

The cupping results in this study showed a final score of 83.88, indicating that Lahat Robusta coffee from South Sumatra meets the specialty coffee standards based on the Fine Robusta protocol. A cupping score of ≥80 indicates specialty coffee (Duke et al. 2025). Beans with scores below this threshold are categorized as exchange grade or commercial coffee, which generally focuses on production volume efficiency. Specialty coffee has a unique flavor profile resulting from the specific interaction between geographical conditions (terroir) and natural postharvest processing. Unlike commercial coffee, which is volume-oriented, specialty coffee demands high-quality standards. Specialty status is not just a marketing label but a quality certification that proves the consistency of post-harvest processing (Al-Mahish and Alfayadh 2024). Based on cupping assessments, Lahat Robusta coffee from South Sumatra demonstrated superior quality, with a final score of 83.88, placing it in the specialty coffee category.

The cupping evaluation results not only yielded a final score but also produced a profile of dominant attributes identified by each panelist, such as brown sugar, honey, dark chocolate, hazelnut, fresh fruit, acidity, cereal, and spice, which have the potential to be authentic characteristics of the region. Although the cupping assessment method is a universal standard for coffee quality, it is still indicative and cannot objectively represent the intensity of each attribute as an indicator of product uniqueness. Therefore, further identification is needed to obtain a description and intensity of coffee characteristics, which can be done through sensory analysis such as Quantitative Descriptive Analysis

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

(QDA), which can comprehensively describe, identify, and assess coffee intensity by trained panelists. Through this approach, a more detailed sensory map can be produced, so that the uniqueness of the profile of Lahat Robusta coffee from South Sumatra can be described and measured specifically, free from the subjectivity of the panelists.

3.2 Aroma Characteristics

Aroma is the first sensory profile detected by the human senses, thus playing an important role in determining the impression and level of enjoyment of coffee drinks. The cupping score (Figure 1) for the aroma parameter was 8.0, which shows that Lahat Robusta coffee from South Sumatra has an advantage in terms of aroma. Aroma characteristics are developed during the roasting process through a series of chemical reactions, such as the Maillard reaction and the degradation of precursor components, such as amino acids, trigonelline, sugars, and phenolic compounds, which play a role in aroma formation (Rahayu et al. 2023). Aroma is the main differentiator between specialty and non-specialty coffee and is a determining factor in consumer preferences. The strength of coffee aroma originates from the volatile components formed during the roasting process. Chindapan et al. (2021) stated that the aroma profile consists of various chemical compounds, such as sulfur, pyrazine, pyridine, pyrrole, oxazole, furan, aldehyde, ketone, and phenol, which impart unique/authentic characteristics.

The formation of aroma precursors can occur due to metabolic activity during natural post-harvest processing, which causes the interconversion of low-molecular-weight sugars and protein hydrolysis in the formation of precursor compounds, such as aldehydes, ketones, and alcohols, which undergo transformation through Maillard reactions and thermal degradation during roasting (Zhang et al. 2023). Research (Moon et al. 2023) has reported that volatile compounds such as pyrazines, ketones, aldehydes, heterocyclic nitrogen compounds, acetates, acids, alcohols, esters, and furans act as marker compounds in coffee. Improvements in coffee aroma quality are related to postharvest processing practices. Fardenan et al. (2024) reported that soaking in 3% acetic acid can improve the profile of unripe robusta beans by optimizing flavor precursor components and reducing chlorogenic acid. The superior aroma of robusta coffee has the potential for product diversification, despite limitations in flavor intensity due to its high caffeine content. Therefore, the consistent application of post-harvest technology is a key factor in minimizing coffee-bean damage.

3.3 Flavor Characteristics

Flavor is an important component that influences consumers' decisions to accept or reject a product (Safrizal et al., 2025). Various precursor compounds have been studied, such as the findings of Wang et al. (2025), who reported that the phenolic compound chlorogenic acid contributes to bitter and flat flavors and affects coffee quality. Based on the cupping score of 8.13 for the flavor profile (Figure 1), it can be seen that the flavor parameter is positively correlated with the chemical composition of coffee

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

beans through post-harvest processing applied by farmers in Lahat, South Sumatra, Indonesia. In line with the study by Zhai et al. (2024), it has been reported that the natural processing of coffee produces an abundance of organic acids that affect flavor. The application of the wet process through anaerobic fermentation in the natural processing method increases the content of organic acids, particularly malic, acetic, and citric acids. The high citric acid content contributes to the acidity and stimulates berry and fruity notes, providing a richer flavor dimension. Cardoso et al. (2023) indicated that the complexity of coffee flavor stems from the interaction between carbohydrates and amino acids through two Maillard reaction pathways: Strecker degradation of α-dicarbonyl compounds reacting with amino acids to form alkylpyrazine oxazoline and oxazole compounds. In the amino acid pathway, precursors such as cysteine, proline, α-aminoketones, and α-dicarbonyls contribute to the formation of thiazoles, thiazolines, pyrroles, and pyridines. In addition, the protein content of green coffee beans can trigger the accumulation of pyrazines, which are key to the nutty, almond, and sweet sensory characteristics of coffee.

3.4 Aftertaste Characteristics

Aftertaste is the taste appearance left behind when panelists taste coffee, which leaves a strong or subtle impression on the mouth. The assessment of the aftertaste parameter is based on the impressions it leaves. If the coffee leaves a thick residue that sticks to the mouth, it receives a low score. However, if the aftertaste is smooth and does not feel unpleasant in the mouth, it receives a high score (Rosdiana et al., 2024). The cupping test results for Robusta coffee from Lahat, South Sumatra, for the aftertaste parameter scored 7.94, similar to salt/acid and balance (Figure 1). This assessment was classified as very good, close to a score of 8. This score indicates balance and consistency with the same scores. Talitha et al. (2025) reported the cupping scores for the aftertaste parameter of Robusta coffee brewed with V60, Americano, and tubruk, which had a relatively clean aftertaste characteristic and was not disturbing or excessively bitter. Aftertaste is related to the coffee brewing method. Ahmad et al. (2024) confirmed that failure to control agitation during brewing can cause under-extraction, where low turbulence inhibits the dissolution of coffee compounds, resulting in a weak body profile and a lingering and harsh aftertaste. Fadhil et al. (2021) state that intensity of bitterness and aftertaste are the main direct indicators that influence the overall perception of coffee quality, supported by the overall score obtained in this study, which was not far off at 8.06.

The variability in aftertaste perception among cuppers is caused by the different tongue receptor sensitivities in each individual. Therefore, Herawati et al. 2022 reported that the cupping method has limitations in providing absolute quality scoring due to the element of subjectivity. As an alternative to obtaining a more precise and objective description of coffee characteristics, testing using the Quantitative Descriptive Analysis (QDA) method is needed to identify, describe, and assess coffee quality. Guami et al. (2024) reported that descriptive analyses can reveal significant differences in sensory attributes among 22 robusta coffee clones.

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

3.5 Salt/Acid Characteristics

The cupping score of 9 (Figure 1) for the salt/acid parameter, which is 7.94 (very good), indicates that the sensory profile is close to the fine category. This finding is similar to that of Guami et al. (2024), who reported that the LE-A1 robusta coffee clone produced similar values. However, this differs from Safrizal et al. (2025), who reported that cupping results only reached a score of 6.0 with dry (natural) and wet post-harvest coffee processing. This shows that Robusta coffee has unique characteristics in each region. Low coffee quality can be influenced by various factors. Rendilwa et al. (2021) optimized the improvement of coffee cupping scores through blending techniques, reporting that coffee from various regions produced cupping scores of up to 80. However, this technique causes the authentic coffee characteristics to be lost. Therefore, efforts can be made to evaluate and optimize post-harvest processing practices, because the formation of chemical components in coffee during the processing has a positive correlation with the sensory profile of coffee, such as the presence of sucrose compounds which increase sweetness and body and reduce excessive bitterness and acidity. Meanwhile, trigonelline and chlorogenic acid compounds play a role in providing a complex flavor dimension through the formation of aromatic compounds such as furan and pyrazine during the roasting process.

3.6 Bitter/Sweet Characteristics

Coffee has various precursor compounds in flavor formation, such as caffeine, which correlates with a bitter taste and contributes about 30% (Gao et al. 2021). Sensomic and chemometric research reported by Ban et al. 2025 states that although caffeine is an intrinsic component of bitterness, the decaffeination process does not significantly alter the pattern of bitter taste development during roasting and brewing. This shows that changes in chemical compounds due to heat play a dominant role in determining the sensory profile of coffee compared to caffeine concentration. Bitter taste can be formed through a series of chemical compound formations, such as chlorogenic acid undergoing degradation during the roasting process, which produces caffeic acid and quinic acid, contributing to the bitter taste of coffee. Supported by Omega et al. 2023, it is stated that the caffeine compound contained in robusta coffee is an alkaloid compound that can cause bitterness but does not significantly affect the taste of coffee because it only contributes about 10% of the bitterness. The research results (Figure 1) report a bitter/sweet cupping parameter value of 7.88 (very good), which is not far from the aftertaste, salt/acid, and balance scores.

Natural processing through sunlight intensity is able to preserve secondary metabolites such as chlorogenic acid and its derivatives, which play a role in the taste of coffee Wang et al. 2025. In addition, the genetic factors of the coffee species provide chemical components such as carbohydrates, proteins, amino acids, and phenolic components, which are then enriched through processing methods that cause microbial metabolic activity by synthesizing secondary organic compounds as precursor compounds in the formation of aroma and flavor profiles during roasting (Mahingsapun et

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

al. 2022). Natural processing produces sweet coffee characteristics due to the high content of polysaccharides and minerals from the mucilage layer. However, the quality of coffee products in this process may not be uniform due to weather factors such as rainfall, sun exposure time, and temperature.

3.7 Mouthfeel Characteristics

Mouthfeel is a sensory attribute that develops through perception derived from the interaction between food or beverage components, oral receptors, and saliva, making mouthfeel inherently multisensory and highly dependent on context, which has a significant impact on consumer preferences, sensory satisfaction, and overall product acceptance (Wolinska-Kennard et al. 2025). Supported by research from Genovese et al. 2025, it is stated that mouthfeel contributes to the perception of coffee body, described as the physical sensation when moving the tongue against the roof of the mouth or gums, and astringency. The cupping test results (Figure 1) of this study obtained a score of 8.0 for the mouthfeel parameter, indicating that Lahat robusta coffee with natural processing has superior sensory quality and is classified as fine. Sagita et al. (2025) stated that Robusta coffee wet-processed through ohmic heating-based controlled fermentation successfully optimized the accumulation of flavor precursor metabolites. This shows that post-harvest processing plays an important role in producing high-quality coffee, and this study proves that natural post-harvest processing of coffee can produce stability and mouthfeel attributes that are competitive with controlled wet processing methods. This phenomenon proves that the right post-harvest approach not only ensures quality consistency but also contributes to producing unique and high-value sensory profile characteristics.

3.8 Uniformity and Clean Up Characteristics

Evaluation of coffee characteristics through the cupping method (Figure 1) shows that the quality of Robusta coffee from Lahat, South Sumatra, in terms of uniformity and clean up parameters, achieved a score of 10 through natural post-harvest processing. These results are in line with the study by Santoso et al. (2025), which reported similar uniformity values for various Robusta coffee processing methods using various techniques, namely natural aerobic, anaerobic, honey, full wash, and wine. The uniformity and clean up parameters in this study show that Lahat Robusta coffee from South Sumatra has optimal consistency and uniformity in taste. This is in line with the research by Fardenan et al. (2024), which reported that Robusta coffee treated with acetic acid immersion (0–5%) for 30–90 minutes produced a clean cup and uniformity score of 10. These results prove that natural post-harvest processing can achieve equivalent quality and flavor consistency standards without the need for additional chemical treatment factors. However, this differs slightly from the results of a study by Santoso et al. (2025), which reported a clean cup score of 8.0 for Robusta coffee. This difference in scores shows that Robusta coffee has complex characteristics with hygroscopic and

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

biochemical properties that are highly sensitive to post-harvest processing and the geographical origin of the coffee.

3.9 Balance and Overall Characteristics

The balance parameter in coffee evaluation through cupping is an important indicator in representing the sensory profile characteristics of coffee. The results of this study show that the cupping score (Figure 1) for the balance parameter is 7.94 (very good), which is not much different from the results of Widyasari et al. (2023), who reported cupping scores ranging from 7.0 to 7.8. The balance parameter has a linear relationship with the overall assessment, which represents the overall taste characteristics of coffee. The overall cupping score of this study was 8.06, similar to the results of Guambi et al. (2024), who reported an overall cupping score of 8.13. The direct relationship between the overall parameter and balance shows that the panelists' subjectivity in assessing the overall quality is greatly influenced by their perception of the balance of the sensory profile. Thus, Lahat Robusta coffee from South Sumatra exhibits complex and consistent coffee characteristics.

4. Conclusion

Robusta coffee from Lahat, South Sumatra, has superior quality and meets specialty coffee standards (fine robusta) with a final cupping score of 83.88. Natural post-harvest processing produces optimal consistency and uniformity of flavor, represented by a score of 10 (outstanding) for the uniformity and clean cup parameters. This study proves that proper post-harvest processing is correlated with superior coffee quality. The cupping results obtained a sensory profile dominated by characteristics of brown sugar, honey, dark chocolate, hazelnut, fresh fruity, nutty, acidic, cereally, and spicy. These results can be used as a starting point to identify the uniqueness of Lahat Robusta coffee from South Sumatra.

5. AI Writing Statement

The author used the Generative AI tool ChatGPT solely for language editing in the Introduction section. All analyses, data interpretations, and conclusions are the result of the author's own thinking

6. References

Adhil, R., Nurba, D., & Sukmawati, E. (2021). Sensory assessment of gayo arabica coffee taste based on various varieties and manual brewing devices. Coffee Science-Issn 1984-3909, 16, E161918-E161918.

Ahmad, K., Eviana, N., & Yusrini, L. (2024). Brewing excellence: improving coffee quality using the v60 stirred-agitation technique. Journal Of Responsible Tourism Management, 4(1).

Al-Mahish, M., & Alfayadh, R. (2024). The impact of coffee quality attributes and ratings on specialty coffee bean prices. Beverage Plant Research, 4(1).

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

Badan Pusat Statistik. 2024. Statistik Kopi Indonesia 2023. Badan Pusat Statistik

Ban, Y., Park, H., Hong, S. J., Yu, S. Y., Moon, H. S., & Shin, E. C. (2025). Sensomics and chemometrics approaches of differential brewed and roasted coffee (Coffea Arabica) from ethiopia using biomimetic sensory-based machine perception techniques: effects of caffeine on bitter taste and the generation of volatiles. Food Chemistry, 476, 143407.

Banti, M., & Atlaw, T. (2024). Physicochemical and cup quality of coffee as affected by processing methods and growing locations. Cyta-Journal Of Food, 22(1), 2329760.

Bastian, F., Nadhifa, D. G., Mahendradatta, M., Laga, A., Salengke, S., & Payung, J. N. P. B. (2025). germination induced metabolic changes to improve taste and flavor characteristics of off-grade robusta coffee beans. Applied Food Research, 101329.

Bolka, M., & Emire, S. (2020). Effects of coffee roasting technologies on cup quality and bioactive compounds of specialty coffee beans. Food Science & Nutrition, 8(11), 6120-6130.

Cardoso, W. S., Dias, S. R., Coelho, V. S., Pereira, L. L., Fioresi, D. B., & Pinheiro, F. D. A. (2023). maillard reaction precursors and arabica coffee (coffea arabica l.) beverage quality. Food And Humanity, 1, 1–7.

Chindapan, N., Puangngoen, C., & Devahastin, S. (2021). Profiles of volatile compounds and sensory characteristics of robusta coffee beans roasted by hot air and superheated steam. International Journal Of Food Science And Technology, 56(8), 3814-3825.

Darmawan, B. (2025). Karakteristik Senyawa flavor green beans kopi dengan variasi proses pengolahan buah ceri dan pengeringan. Zigma, 40(1), 273-281.

Duke, B. W., Mokonon, M. A., Mekonin, N. D., & Kuffi, K. D. (2025). Effects of roasting degree and grinding size on caffeine content and sensorial quality of coffee. Journal Of Food Quality, 2025(1), 2405668.

Fardenan, D., Suroto, D. A., & Supriyadi, S. (2024). Effect of acetic acid immersion on the taste and aroma quality of immature robusta coffee beans. Czech Journal Of Food Sciences, 42(6).

Fibrianto, K., Ferrasta, O. A., & Bimo, I. A. (2024). Comparative study of traditional and lab-scale roasting method for unpeeled robusta coffee in bromo-tengger-semeru mountain slope regions. Advances In Food Science, Sustainable Agriculture And Agroindustrial Engineering (Afssaae), 7(4), 324-337.

Gao, C., Tello, E., & Peterson, D. G. (2021). Identification of coffee compounds that suppress bitterness of brew. Food Chemistry, 350, 129225

Genovese, A., Caporaso, N., & Baiano, A. (2025). The impact of brewing methods on the quality of a cup of coffee. Beverages, 11(5), 125.

Guambi, L. A. D., Solórzano, R. G. L., Avellán, L. F. P., & Corozo-Quiñónez, L. (2024). Organoleptic attributes of 22 robusta coffee clones and potential for specialty coffee production in ecuador. Applied Food Research, 4(2), 100567.

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

Herawati D, Andarwulan N. 2023. Ragam Spesies Dan Proses Kopi. Bogor (Id): IPB Press

Herawati, D., Giriwono, P. E., Dewi, F. N. A., Kashiwagi, T., & Andarwulan, N. (2019). Critical Roasting Level Determines Bioactive Content and Antioxidant Activity of Robusta Coffee Beans. Food Science And Biotechnology, 28(1), 7-14.

Herawati, D., Loisanjaya, M. O., Kamal, R. H., Adawiyah, D. R., & Andarwulan, N. (2022). Profile of Bioactive Compounds, Aromas, and Cup Quality of Excelsa Coffee (Coffea Liberica Var. Dewevrei) Prepared Using Diverse Postharvest Processes. International Journal Of Food Science, 2022(1), 2365603.

Hetzel A. 2011. Fine Robusta Standards and Protocols. Coffee Quality Institute: Uganda Coffee Development Authority: 28-32.

Khapre, Y., Kyamuhangire, W., Njoroge, E. K., & Kathurima, C. W. (2017). Analysis of The Diversity of Some Arabica and Robusta Coffee From Kenya and Uganda By Sensory and Biochemical Components and Their Correlation to Taste. Iosr Journal Of Environmental Science, Toxicology And Food Technology (Iosr-Jestft), 11(10), 39-43.

Luna Gonzalez, A., Macias Lopez, A., Taboada Gaytan, O. R., & Morales Ramos, V. (2019). Cup Quality Attributes of Catimors as Affected by Size and Shape of Coffee Bean (Coffea Arabica L.). International Journal Of Food Properties, 22(1), 758-767.

Mahingsapun, R., Tantayotai, P., Panyachanakul, T., Samosorn, S., Dolsophon, K., Jiamjariyatam, R., Srisuk W. L. N., & Krajangsang, S. (2022). Enhancement of Arabica Coffee Quality with Selected Potential Microbial Starter Culture Under Controlled Fermentation In Wet Process. Food Bioscience, 48, 101819.

Moon, S. A., Wongsakul, S., Kitazawa, H., & Saengrayap, R. (2025). Comparative Analysis Of Post-Harvest Processing and Drying Techniques on the Cupping Quality Of Thai Arabica Coffee. Journal Of Agriculture And Food Research, 101991.

Mulindwa, J., Kaaya, A. N., Muganga, L., Paga, M., Musoli, P., Sseremba, G., ... & Bitalo, D. N. (2022). Cup Quality Profiles Of Robusta Coffee Wilt Disease Resistant Varieties Grown In Three Agro‐Ecologies In Uganda. Journal Of The Science Of Food And Agriculture, 102(3), 1225-1232.

Nurhidayah, N., Parawansa, A. K., & Suherah, S. (2025). Intensitas Serangan Penyakit Karat Daun (Hemileia Vastatrix) Pada Tanaman Kopi Kabupaten Gowa. Agrotekmas Jurnal Indonesia: Jurnal Ilmu Peranian, 6(1), 80-85.

Oliva-Cruz, M., Silva-Valqui, R. Y., Santillan-Culquimboz, H., Juarez-Contreras, L., Oliva-Cruz, C., Méndez-Fasabi, L. D., ... & Silva-Valqui, G. (2024). Sensory Quality Of Coffee (Coffea Arabica L.): Influence Of Tree Diversity And Harvest Segmentation In Agroforestry Systems. Journal Of Agriculture And Food Research, 18, 101347

Omega, F. A., & Wibisono, Y. (2023). Kajian Lama Fermentasi Terhadap Kadar Kafein, Etanol Dan Ph Bubuk Kopi Robusta (Coffea Canephora) Argopuro. Jofe: Journal Of Food Engineering, 2(1), 34-44.

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.014.2.200-211

Rosdiana, E., Erliana, J., Ali, F. Y., Setyoko, U., & Anindita, D. C. (2024). Test Of Level Of Likes On Fermentation Length And Physical Quality Characteristics Of Robusta Coffee After Storage. Jurnal Riset Perkebunan, 5(2), 88-93.

Safrizal, S., Safmila, Y., Jannar, M., Yusmanizar, Y., & Idkham, M. (2025). Assessment Of Robusta Coffee Quality Using Parameters Of Specialty Coffee Association By Analytical Hierarchi Process (Ahp) Method. Jurnal Teknik Pertanian Lampung (Journal Of Agricultural Engineering), 14(4), 1282-1290.

Sagitaa, D., Rukmanac, J., Utamic, D., Andriansyahd, R. C. E., Ekafitria, R., Kristantid, D., Kumalasaria, R., Setiabomad, W., Yuliantia, L. E., Putria, D. P., Hidayat, D. D. (2025). Effect Of Green Coffee Beans Fermentation With And Without Ohmic Heating: Physicochemical And Sensory Properties. Journal Of Future Foods.