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The Flavor Profile of Semendo Arabica Coffee in Semende, Muara Enim, South Sumatra, Influenced by Processing and Brewing Methods

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Abstract: This research explores the flavor profile of Arabica coffee from Semendo, South Sumatra, Indonesia. Arabica coffee from Semendo is renowned for its unique flavor profile, characterized by dominant acidity and sweetness. The coffee processing methods and brewing techniques play a crucial role in creating diverse flavor characteristics. Additionally, geographic factors such as elevation and climate conditions impact the quality of Arabica coffee from Semendo. This study aims to delve deeper into the coffee processing methods and brewing techniques of Arabica coffee from Semendo and the factors influencing its flavor. We applied a qualitative descriptive approach using data collection methods including interviews, field observations, and documentation. We explored how processing methods, such as the natural method, washed method, and honey process, and brewing techniques, including espresso-based and manual brew, impart unique flavor characteristics to Arabica coffee from Semendo. Our data shows that the natural processing method produces coffee with a dominant sweetness and distinctive floral aroma. The washed method brings out sharp fruitiness and high acidity, creating a fresh and profound coffee-drinking experience. Meanwhile, the honey process exhibits special sweetness with a prominent fruity touch. The roasting of coffee beans by roasters also has a significant impact on the flavor profile of Arabica coffee from Semendo. Lighter roasting results in a bright flavor with strong acidity, while darker roasting imparts heavy and bold flavor characteristics. Brewing methods such as espresso-based and manual brew influence the coffee's viscosity, intensity, and acidity. Espresso-based brewing provides a more intense and bold flavor experience, while manual brew yields a lighter and well-balanced coffee. Our research methods included interviews with coffee farmers, baristas, and customers, observations in Semendo coffee plantations, and documentary studies to gain a profound understanding of Arabica coffee from Semendo. Our data highlights the importance of selecting the right processing and brewing methods to create a flavor experience aligned with individual preferences. The results of this research are expected to provide valuable guidance for coffee producers, artisans, and coffee enthusiasts who wish to better understand and appreciate the diverse and unique flavor characteristics of Arabica coffee from Semendo.

Keywords:- *Arabica, Semendo, Flavor Profile, Methods, Processing, Brewing, Roasting, Characteristics.*

I. INTRODUCTION

Arabica coffee is one of the coffee varieties known for its unique and high-quality flavor compared to other types of coffee. According to Arlius, Tjandra, & Yanti (2017), Arabica coffee holds greater appeal in the global market. Furthermore, Arabica coffee originating from Indonesia, including that grown in the Semendo region, has long been recognized in the international market and commands a higher price than other coffee types like Robusta (Kusmiati & Nursamsiyah, 2015). This price difference is largely influenced by the differing caffeine content between Arabica and Robusta coffee. Robusta coffee has a caffeine content of around 57.87% (Sabarni, 2018), while Arabica coffee has a much lower caffeine content of approximately 3.50% (Fadri, 2020).

The characteristics of Arabica coffee from Semendo, particularly from the Semende village in the Muara Enim region, South Sumatra, have been gaining popularity in the global coffee market. Arabica Semendo coffee has captured the attention of coffee enthusiasts due to its unique taste and aroma. One of the distinctive features of Arabica Semendo coffee is its dominant acidity compared to bitterness, creating a fresh and vibrant flavor profile. Arabica Semendo coffee is also known for its citrus and fruity aroma and flavor (A. Kinasih, 2021).

Moreover, coffee processing methods and brewing techniques play a crucial role in producing diverse flavor profiles. Arabica Semendo coffee encompasses various processing methods that yield distinct profiles of sweetness, acidity, and bitterness, allowing for the categorization of its flavor. The coffee brewing process is a critical stage in flavor development, where aroma and flavor compounds are extracted by hot water. In this context, variations in brewing methods such as V60 and espresso influence the intensity and flavor character of Arabica Semendo coffee.

The South Sumatra province, especially in the highlands, serves as one of the national coffee production centers. In South Sumatra, Arabica coffee is thriving in various highland regions, including the Muara Enim Regency. The Semende Darat Tengah, Semende Darat Ulu, and surrounding areas in Muara Enim have become hubs for Arabica Semendo coffee

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production. The ideal altitude ranging from 1,200 to 1,500 meters above sea level in these areas creates optimal conditions for Arabica coffee cultivation (Agus Darwa, 2022).

Arabica Semendo coffee, also known as Semendo coffee, has become a flagship product in various coffee shops across Indonesia. However, it is important to note that while this coffee can be an enticing product for coffee connoisseurs, incorrect processing and brewing methods can lead to the loss of its unique flavor characteristics. Therefore, this research aims to delve deeper into the various processing and brewing methods of Arabica Semendo coffee and identify the factors influencing its flavor profile. This study is expected to provide valuable guidance for coffee producers, flavor evaluators, and coffee enthusiasts in understanding and appreciating Arabica Semendo coffee more effectively and supporting the development of high-quality coffee from this region.

II. LITERATURE REVIEW

Arabica coffee possesses a complex flavor profile with a tendency towards acidity, unlike Robusta coffee, which leans towards bitterness (Budiman Haryanto, 2012). Arabica coffee dominates 70 percent of the global coffee market (Budiman Haryanto, 2012). This coffee type is highly favored by coffee enthusiasts in several countries, with a significant portion of it being exported to the specialty coffee market segment. Arabica coffee is renowned for its superior characteristics and flavor (Mia Azizah, 2019). The caffeine content in Arabica coffee is significantly lower than that in Robusta coffee (Muhammad Irvan Aryadi, Febrina Arfi, Muhammad Ridwan Harahap, 2020).

According to Gladwell in Hadi (2016), the taste of a product is crucial for its appeal. The beverage presented to consumers must be able to tantalize their taste buds by offering a wide range of flavors. The physical quality and flavor of Arabica coffee are determined by its processing (Borem et al., 2012). Arabica coffee processing can be done through dry processing or wet processing. Arabica coffee farmers often opt for the dry processing method. Dry processing involves periodic drying to remove mucilage, but it has the drawback of yielding relatively low flavor and aroma. One of the crucial factors that determine the quality of the final brew of Arabica coffee is wet fermentation. Wet processing enhances flavor and aroma more effectively than dry processing, removing bitterness, imparting viscosity, producing good acidity, and a mild impression in the coffee brew (Yusianto et al., 2013). However, Arabica coffee has lower caffeine content and higher sugar content compared to Robusta coffee, so wet fermentation for Arabica coffee takes longer, around 24-36 hours, compared to wet processing of Robusta coffee (Mulato, 2002). Excessive fermentation time can result in defects in coffee beans and a foul odor in coffee (Yusianto, 2014).

Muara Enim Regency is one of the top three major coffee producers in South Sumatra Province. In 2021, coffee production in Muara Enim Regency amounted to 27,594 tons, with the primary production area located in the Semendo Darat Laut Subdistrict, contributing 11,835 tons. The majority of the coffee produced is of the Robusta variety. Arabica coffee from the Semendo region in South Sumatra is a unique coffee variety highly valued in the world of coffee. The Semendo region, situated in South Sumatra, Indonesia, provides an ideal environment for coffee cultivation. The combination of high altitudes and volcanic soil creates a territory that contributes to the unique taste and quality of Semendo Arabica coffee. The cool climate and distinct rainfall patterns influence the growth and ripening of coffee cherries, resulting in a profile appreciated for its balance, smoothness, and acidity.

III. METHODOLOGY

This research was conducted using a qualitative descriptive approach. According to Sugiyono (2016:9), a qualitative research method is used to investigate natural conditions where the researcher serves as the key instrument. Therefore, this research was carried out qualitatively with the aim of providing a detailed and in-depth description of the taste of Semendo Arabica coffee influenced by its processing and brewing methods.

The data collection methods employed were interviews, observations, and documentation. As per Saroso (2017:47), interviews are one of the most commonly used tools for collecting qualitative research data. Through the use of interview techniques, participants can convey information more directly, allowing researchers to obtain more detailed answers to the questions posed to the participants. According to Sugiyono (2018:229), observation is a data collection technique with specific characteristics when compared to other techniques. Observation is not limited to people but also includes other natural objects. In this research, the researcher chose to collect data using participatory observation techniques, enabling direct involvement in data collection and information retrieval to address the research questions. Data collection was conducted through field observations in Semendo Arabica coffee plantations in the village of Semendo, Muara Enim, and interviews were conducted with coffee farmers in the Semende village, baristas in coffee shops using Semendo Arabica coffee, as well as customers in these coffee shops.

According to Sugiyono (2018:476), documentation is a method used to obtain data and information in the form of books, archives, documents, numerical and pictorial writings, as well as reports and statements that can support research. The researcher used documentation techniques because the required data could be more easily obtained and were more tangible from the research site and through interviews. To test data validity, the researcher used triangulation. As defined by Sugiyono (2017:273), triangulation as a data collection technique refers to the combination of various data collection techniques and existing data sources. In this research, the researcher conducted data analysis, including data reduction, which involves selecting, focusing on simplifying, abstracting, and transforming the "raw" data that emerged from field notes. In this research, the researcher attempted to present data related to the results of the researcher's interviews with research sources on what was considered a research

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problem. The researcher drew conclusions from the data obtained from interviews, observations, and documentation. These conclusions were also verified during the research.

IV. RESULT AND DISCUSSION

The research results based on interviews, observations, and documentation indicate that post-harvest methods influence the flavor profile of Semendo Arabica coffee. The post-harvest process is divided into the natural method, the washed method, and the honey process method. Here are the details of each post-harvest method:

A. Natural Method

The natural processing method in the production of Semendo Arabica coffee is one of the distinctive features that sets this coffee variety apart from others. In this method, Arabica coffee beans are processed by allowing them to dry inside their fruit's skin, without prior pulping. The drying process is carried out either under direct sunlight or in special drying machines. The outcome of the natural method is coffee with a unique and distinct flavor profile.

Fig 1 Process of the Natural Method

One of the most striking characteristics of naturally processed Semendo Arabica coffee is the presence of a strong sweetness. Coffee beans drying within the fruit's skin absorb the natural sugars from the coffee fruit, which then become the key to creating a dominant sweet flavor. The natural fermentation process that occurs within the fruit's skin during drying also plays a role in producing the distinctive floral aroma, which is one of the primary characteristics of naturally processed Semendo Arabica coffee.

In addition to the dominant sweet taste, naturally processed Semendo Arabica coffee is also known for its relatively low level of acidity. This means that the coffee tends to emphasize a gentle, non-dominant acidity. The combination of strong sweetness and distinctive floral aroma creates a unique and captivating coffee-drinking experience.

It is important to note that the natural processing method requires extra attention to the drying of coffee beans to avoid over-fermentation or excessive humidity. While it offers a unique flavor profile, the natural method is also susceptible to quality risks if not managed carefully. Therefore, coffee producers and artisans in the Semendo region of South Sumatra continue to refine their skills in executing this processing method with precision to maintain the quality and consistency of the highly esteemed Semendo Arabica coffee in the specialty coffee market.

B. Washed Method

Semendo Arabica coffee, grown in the Semendo region of South Sumatra, Indonesia, possesses unique characteristics that inspire a meticulous post-harvest process. The post-harvest process of the washed method for Semendo Arabica coffee involves a series of steps that influence its final flavor.

Fig 2 The Results of the Washed Method

Here is further information about the post-harvest process in the washed method for Arabica Semendo coffee:

- *Handpicking:*

One of the initial stages in the post-harvest process is the manual handpicking of coffee cherries. Skilled farmers carefully select only fully ripe cherries. This is crucial to ensure optimal coffee quality, as only mature beans have the best flavor.

- *Pulping:*

After picking, the coffee beans are separated from the cherries through a process known as pulping. The coffee beans are then categorized based on their level of ripeness and quality. Unripe or defective beans are sorted out and removed.

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➢ *Fermentation:*

The pulped coffee beans are placed in fermentation tanks. This fermentation process is essential as it affects the coffee's flavor profile. Typically, the beans are fermented for about 24-36 hours, although the fermentation time may vary depending on weather conditions and the farmer's preference.

➢ *Washing and Drying:*

After the fermentation process is complete, the coffee beans are thoroughly washed to remove any remaining mucilage and cherry skin. This process helps produce clean and contaminant-free coffee beans. The washed beans are then sun-dried to reach the appropriate moisture content. Drying is also a crucial step in locking in the coffee's flavor characteristics.

➢ *Hulling and Sorting:*

Once the coffee beans are completely dried, they undergo hulling, where the protective layer of the beans is removed. The peeled coffee beans are carefully inspected to ensure that only the highest-quality beans are selected.

The washed post-harvest process ensures that Arabica Semendo coffee is meticulously processed to create its distinctive flavor profile, often described as having sweet fruity notes, balanced acidity, and a rich, deep body. The excellence of this process, combined with the ideal geographical environment, has made Arabica Semendo coffee one of the finest coffees produced in Indonesia.

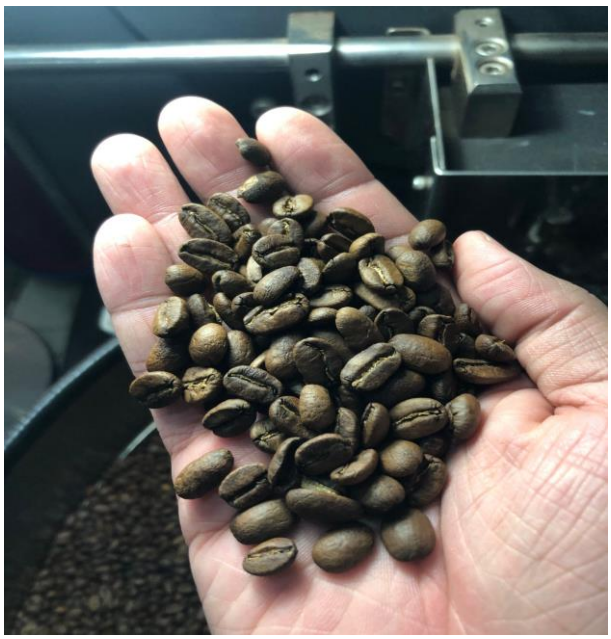

Fig 3 The Result of Coffee Processed using the Washed Method after Roasing

The washed method has a significant impact on the flavor of coffee. Here are some main influences that are observed:

➢ *Clean Taste:*

The washed method produces coffee with a prominent clean taste. Well-washed coffee beans have a cleaner and purer flavor.

➢ *Acidity Quality:*

Coffee processed with the washed method tends to have a higher level of acidity. Bright and fresh acidity is often a primary characteristic.

➢ *Flavor Balance:*

The even washing process helps achieve a good balance between acidity, sweetness, and the body of the coffee. This creates a complex and well-balanced flavor profile.

➢ *Defined Aroma:*

The washed method assists in preserving coffee aromas more effectively. The distinct aroma of the coffee is better defined, offering a rich aromatic experience.

➢ *Flavor Sharpness:*

Coffee processed with the washed method often has improved flavor sharpness. This presents sharper and more distinct flavor nuances.

These factors contribute to the unique and desirable characteristics of coffee processed using the washed method.

C. Honey Process Method

Arabica coffee from Semendo is known for its various processing methods that result in unique flavor characteristics. One of the well-known methods used is the honey process, which creates coffee with exceptionally sweet flavor characteristics.

Fig 4 The Process of Honey Process Method

The honey process begins with the careful selection of fully ripe coffee cherries. The coffee beans are separated from the fruit's pulp meticulously. Then, the separated coffee beans are placed in a covered container to initiate the fermentation process. The duration of fermentation can vary, but it usually lasts for several days. This process allows the enzymes in the coffee fruit mucilage to interact with the coffee beans, imparting the distinctive sweet touch to the coffee beans.

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Once the fermentation process is completed, the coffee beans are thoroughly washed to halt the fermentation and cleanse them from the fruit mucilage. Subsequently, the coffee beans are dried until they reach the desired moisture content. The result is coffee beans with a unique sweet flavor profile, often characterized by notes of sugar and prominent fruity undertones. A strong and sweet aroma accompanies this coffee.

Evaluation by flavor experts and coffee assessors has demonstrated that the honey process method successfully creates a special flavor profile for coffee. The remarkable sweetness of this coffee stands out as the main positive highlight in their assessments. The honey process method adds a different flavor dimension, making it an intriguing and distinctive choice compared to other coffee processing methods.

When the honey process method is applied to Semendo Arabica coffee, the unique geographical background of the region also influences the flavor characteristics of the coffee beans. The fertile highlands of Semendo and its ideal climate for coffee growth ensure that the coffee beans used are of high quality. The honey process on Semendo coffee beans creates coffee with a remarkably sweet touch, reflecting the fusion of nature and skill in coffee processing. This is one of the reasons why Semendo Arabica coffee is increasingly recognized and sought after by coffee enthusiasts worldwide who appreciate the unique and captivating coffee flavor experience.

Next, we will evaluate the influence of roasting and brewing on the flavor characteristics of Semendo Arabica coffee.

D. Roasting

The coffee bean roasting process by roasters plays a key role in shaping the final flavor characteristics of coffee. Precision in roasting enables the development of a variety of flavors in Semendo Arabica coffee, greatly appreciated by coffee enthusiasts.

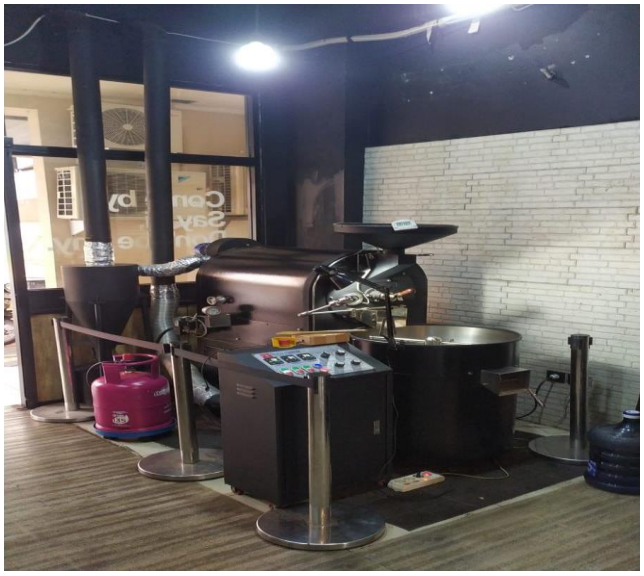

Fig 5 Coffee Roastery Machine

Lighter roasting tends to produce coffee with a brighter flavor profile and a strong acidic accent. This means that Semendo Arabica coffee roasted lightly tends to have a brighter and fresher taste. The strong acidity reflects the sharp and invigorating characteristics of coffee, creating a dynamic experience for coffee enthusiasts.

On the other hand, darker roasting imparts bolder flavor characteristics and tends to be heavier. This means that coffee roasted darker will have a deeper and bolder taste with the presence of stronger flavor notes. This heaviness is often associated with chocolate, spices, or even caramel-like sweetness.

It's important to note that roasters can fine-tune their roasting profiles to achieve specific flavor goals. The choice of roast level largely depends on the preferences of both the roaster and the consumers. Lighter roasts highlight the unique terroir of the Semendo region, while darker roasts create a more robust and intense flavor. Ultimately, the art of roasting lies in finding the perfect balance to accentuate the desirable qualities of Semendo Arabica coffee beans, making it a truly unique and sought-after coffee variety.

Fig 6 Roasting Process of Arabica Semendo Coffee

The geographical background of the region also influences the roasting process. The highlands of Semendo, rich in nutrients and ideal climate conditions, ensure that the coffee beans used have unique characteristics. Therefore, careful roasting of Semendo coffee beans can yield a variety of flavors that reflect the coffee's potential.

Arabica coffee roasters in Semendo continue to develop their knowledge and skills in the roasting process. By combining geographical aspects with their expertise, they create a diverse range of enticing flavors of Semendo Arabica coffee. With precise roasting, Semendo coffee becomes a product increasingly appreciated by coffee enthusiasts worldwide seeking a distinct and profound tasting experience.

E. Brewing

In addition to processing methods and roasting, brewing methods also significantly impact the taste experience of Semendo Arabica coffee. In this research, we focus on comparing two primary methods, espresso-based and manual brew, with reference to the unique characteristics of Semendo Arabica coffee.

The espresso-based brewing method, when applied to Semendo Arabica coffee, tends to produce coffee with higher viscosity and intensity. This coffee showcases the distinctive flavors of Semendo more prominently. The inherent acidity in this coffee is still perceptible but harmonized with the typical sweetness. The signature floral aroma of Semendo coffee remains present, creating an intense and profound tasting experience. Semendo coffee brewed using the espresso-based method offers a bold and complex flavor experience.

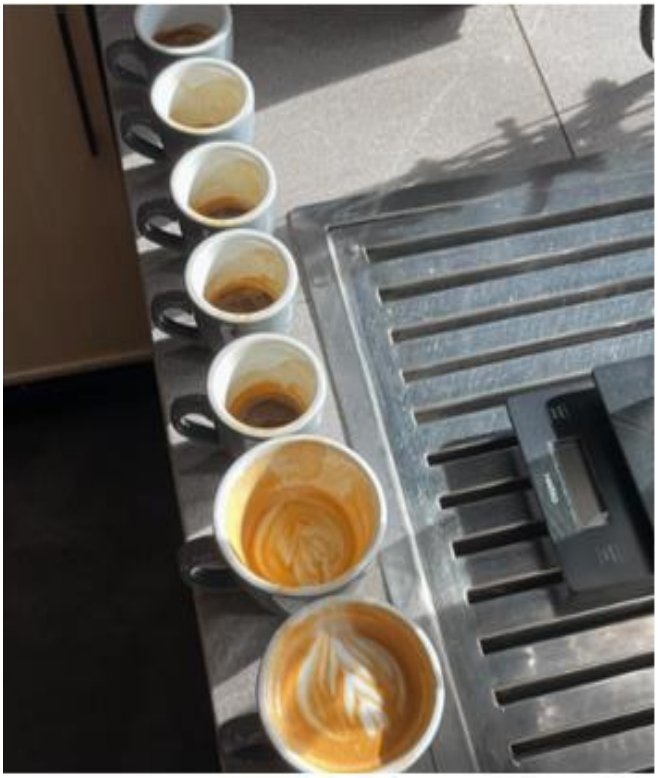

Fig 7 The result of Espresso-Based

Conversely, the manual brew brewing method provides a lighter experience. The solid content in Semendo coffee brewed with the manual brew method is typically lower, resulting in a lighter and balanced cup of coffee. The sweetness and floral aroma are still present, but with a gentler intensity. Slightly lower acidity makes this coffee taste smoother, suitable for those who appreciate coffee with lighter flavor characteristics.

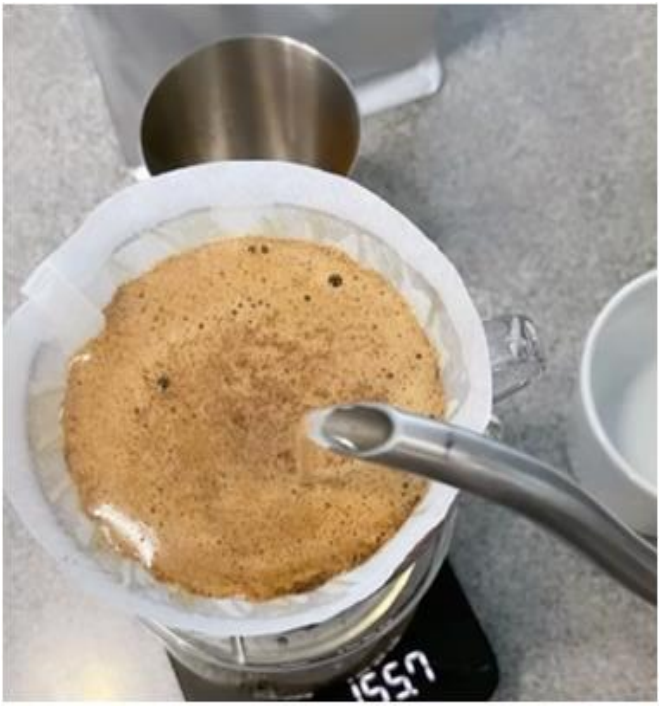

Fig 8 The Process of Manual Brewing

In addition to brewing methods, cupping plays a crucial role in evaluating the quality of Arabica Semendo coffee. Cupping is a testing and evaluation method that encompasses aspects such as taste, aroma, acidity levels, body, and coffee cleanliness. This process uses hot water at a high temperature, reaching 95 degrees Celsius, allowing for a meticulous analysis of the coffee's flavor characteristics.

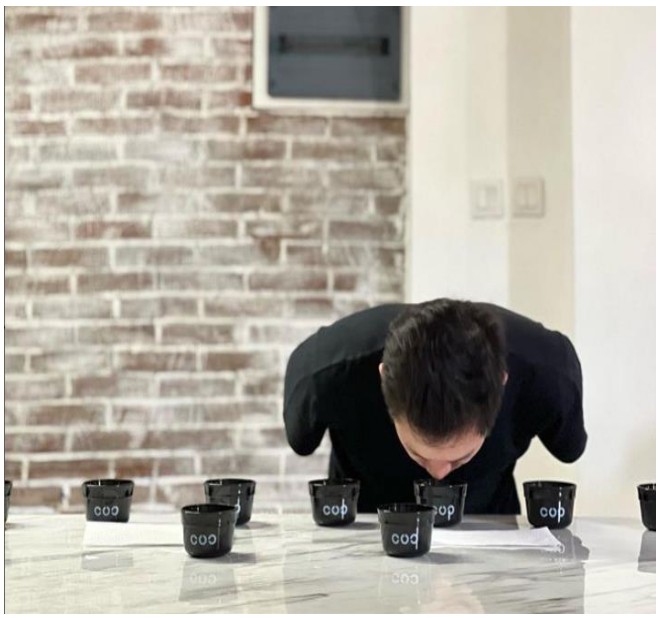

Fig 9 The Process of Cupping

In the context of Arabica Semendo coffee, the cupping process helps reveal the unique flavor characteristics that make this coffee so appealing. The distinctive flavor profile, with its sweet undertones, floral aroma, and balanced acidity, takes the spotlight in the cupping process.

Overall, this research highlights the importance of choosing the brewing method to create a coffee tasting experience that aligns with individual preferences. Arabica Semendo coffee offers a range of flavor characteristics that can be enjoyed through various brewing methods, making it an intriguing choice for coffee enthusiasts seeking variety and depth in their coffee tasting experience while still maintaining its unique and distinctive characteristics.

V. CONCLUSIONS

The results of this research underline the complexity involved in creating the flavor of Arabica Semendo coffee. Post-harvest methods, roasting, and brewing all contribute to the diverse flavor characteristics. The natural post-harvest process highlights sweetness and floral aromas, while the washed method creates sharp acidity. The honey process adds a special sweetness. Roasting and brewing methods also provide different flavor dimensions.

The findings of this research offer valuable insights for coffee farmers, flavor evaluators, and coffee producers interested in producing high-quality Arabica Semendo coffee with unique and profound flavor profiles.

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