



THE DIFFERENCE BETWEEN MANUAL BREWING AND MECHANICAL BREWING IN POUR OVER V60

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ABSTRACT

This research aims to provide a comprehensive analysis of the disparities between manual and mechanical brewing techniques in the context of pour-over V60 coffee preparation. The pour-over method, particularly with the V60 cone, has gained popularity for its ability to highlight the unique flavors of coffee beans. Understanding the nuances between manual and mechanical brewing processes can significantly contribute to refining the coffee brewing experience.

The first objective of this study is to thoroughly investigate the differences between manual and mechanical brewing in the pour-over V60 method. Manual brewing typically involves a hands-on approach, where the barista controls various parameters such as water flow, pouring technique, and timing. On the other hand, mechanical brewing employs automated devices to handle these variables. By comparing the two methods, we aim to identify how factors like precision, consistency, and control impact the final cup of coffee. The second objective focuses on exploring the outcomes of V60 coffee by manipulating grind size, temperature, and brew time. Grind size plays a pivotal role in extraction, influencing the rate at which flavors are released. Temperature affects the solubility of compounds, and brew time determines the duration of extraction. By systematically varying these parameters, we aim to uncover the intricate relationships between grind size, temperature, brew time, and the resulting flavor profile in V60 coffee.

The study employs a rigorous experimental design, using identical coffee beans to isolate the effects of brewing methods and parameters. Through sensory evaluations and analytical measurements, we aim to quantify the impact of each variable on taste, aroma, acidity, and body in the final coffee cup. Additionally, we will explore any potential interactions between the brewing method and the manipulated parameters.

This research contributes to the broader understanding of coffee brewing science and provides practical insights for both coffee enthusiasts and industry professionals. The findings have the potential to guide coffee brewing practices, leading to improved techniques and heightened appreciation of the subtleties involved in crafting the perfect pour-over V60 coffee.

KEYWORDS: *Pour-over V60, Manual brewing, Mechanical brewing, Grind size, Temperature, Brew time, Coffee flavor profile, Brewing methods, Sensory evaluation, Coffee extraction.*

1. INTRODUCTION

Coffee, a beloved beverage around the globe, has evolved into an art form, with enthusiasts continuously seeking the perfect brew. Among the myriad of brewing methods, pour-over coffee has gained popularity for its simplicity and the ability to accentuate the unique flavors of each coffee bean. Within the realm of pour-over, the V60 dripper stands as an iconic vessel for crafting the ideal cup. This research paper delves into the age-old debate: manual brewing versus mechanical brewing in the context of the pour-over V60 method, examining the intricacies, advantages, and outcomes of each approach.

Pour-over brewing, as a manual method, embodies the hands-on craftsmanship of the coffee-making process. It involves the meticulous pouring of hot water over coffee grounds, typically arranged in a conical filter, allowing the water to extract the coffee's flavors as it passes through. Manual brewing enthusiasts appreciate the tactile experience of pouring, fine-tuning the water flow, and maintaining full control over the variables that influence the final cup. On the other hand, mechanical brewing methods, which use automated machines,

seek to replicate the manual process with precision and consistency. While some may argue that it lacks the charm of traditional craftsmanship, mechanical brewing offers repeatability and accuracy that are often elusive in manual brewing.

The pour-over V60, designed by Hario, a Japanese glassware company, has become a cult classic in the coffee world. Its conical shape and spiral ridges inside the dripper facilitate even extraction, making it an ideal canvas for exploring the nuances of coffee. Manual brewing with the V60 requires keen attention to detail. Factors such as grind size, water temperature, pouring technique, and brew time are all carefully controlled to produce a cup that highlights the coffee's unique attributes. It is an intimate and engaging process that can be deeply satisfying for coffee connoisseurs.

Mechanical brewing machines, on the other hand, aim to standardize this process, potentially sacrificing some of the nuances that manual brewers hold dear. Automated V60 brewers promise consistency and precision, with programmable



settings that ensure each cup is identical to the last. While this appeals to busy cafes and those who prefer convenience, it sparks the debate over whether these machines can truly replicate the artistry of manual brewing and preserve the subtleties of each coffee.

2. LITERATURE SURVEY

2.1 Study 1

The impact of coffee on health by A Cano-Marquina, JJ Tarín, A Cano Maturitas 75 (1), 7-21, 2013

The information gathered in recent years has generated a new concept of coffee, one which does not match the common belief that coffee is mostly harmful. This view is further supported by the discovery of a series of phyto-components with a beneficial profile. Reasonable optimism needs to be tempered, however, by the insufficiency of the clinical data, which in most cases stem from observational studies.[1]

2.2 Study 2

Functional properties of coffee and coffee by-products Patricia Esquivel, Victor M Jimenez Food research international 46 (2), 488-495, 2012 Coffee is widely regarded as a functional food due to its numerous health benefits. Its global consumption is extensive, impacting a broad demographic. Ongoing research continues to uncover new advantageous properties, particularly in coffee by-products. Advances in biochemical analysis promise to reveal valuable compounds, addressing environmental concerns about their disposal.[2]

2.3 Study 3

Metabolism of Caffeine and Other Components of Coffee Maurice J. Arnaud Nestec Ltd., Nestlé Research Centre, CH-1000 Lausanne 26, Switzerland Coffee is widely regarded as a functional food due to its numerous health benefits. Its global consumption is extensive, impacting a broad demographic. Ongoing research continues to uncover new advantageous properties, particularly in coffee by-products. Advances in biochemical analysis promise to reveal valuable compounds, addressing environmental concerns about their disposal.[3]

2.4 Study 4

Extraction of caffeine from Robusta coffee (*Coffea canephora* var. Robusta) husks using supercritical carbon dioxide J. Tello, M. Viguera, L. Calvo Department of Chemical Engineering, Universidad Complutense de Madrid, 28040 Madrid, Spain A study explored using supercritical CO₂ to extract caffeine from Robusta coffee husks, finding that pretreatment with moisture and specific operational conditions led to high extraction yields. This method offers an economically viable way to utilize coffee industry waste for high-purity caffeine production.[4]

3. RESEARCH GAP

Based on the literature survey, it is evident that there is no sufficient studies regarding, The difference between manual brewing and mechanical brewing in pour over v60

4. OBJECTIVES

To comprehensively investigate the difference between manual brewing and mechanical brewing in pour over V60 coffee. The outcomes in a V60 coffee by using different grind size, temperature and brew time

5. METHODOLOGY

5.1 Coffee Brewing

Coffee brewing is the process of extracting flavors and aromas from coffee grounds by combining them with water. This can be done through various methods, each influencing the taste and characteristics of the final cup. Common brewing methods includes manual and mechanical brewing. The choice of method, along with factors like grind size, water temperature, and brew time, significantly impacts the flavor profile of the coffee. It's essentially the art and science of transforming coffee grounds into a satisfying and enjoyable beverage.

5.1.1 Types of Coffee Brewing

- Manual Brewing
- Mechanical Brewing

Manual coffee brewing refers to the process of making coffee without the use of automated machines. It often involves hands-on methods where the coffee maker has control over various factors like water temperature, pour rate, and brewing time. Popular manual brewing methods include pour-over (e.g., Hario V60, Chemex), French press, AeroPress, and various types of espresso preparation. Manual brewing allows for a more personalized and nuanced approach to coffee preparation, giving enthusiasts the ability to experiment and tailor their coffee to their preferences.

Mechanical coffee brewing involves the use of automated machines or devices to prepare coffee. This can include traditional drip coffee makers, espresso machines, pod-based systems, and other automatic brewing appliances. Unlike manual brewing, mechanical methods often handle various aspects of the brewing process, such as water temperature, pressure, and extraction time, automatically. These machines are designed to streamline the coffee-making process, offering convenience and consistency in preparing a cup of coffee.

5.2 Test

The V60 coffee underwent the brewing process, following which it underwent a detailed analysis through various analytical factors which are mentioned below

5.3 Analytical Factors

- Texture
- Aroma
- Taste
- Colour

6. RESULTS AND DISCUSSION

Now, let us discuss about **difference between manual brewing and mechanical brewing in pour over V60 coffee**

In comparing manual and mechanical brewing methods in pour-over V60 coffee, our study sought to elucidate the nuanced



differences between these approaches. Through meticulous experimentation, we meticulously controlled variables such as extraction time, water temperature, and coffee grind size to provide a comprehensive analysis.

The manual brewing process involved a hands-on approach, requiring the user to actively manage the pouring technique and water flow. In contrast, the mechanical brewing method employed automated devices to regulate these variables with precision and consistency. Our results revealed intriguing insights into the impact of these approaches on the final coffee product.

One crucial aspect examined was extraction time. In manual brewing, participants displayed a wider range of extraction times due to individual pouring techniques. This variability contributed to diverse flavor profiles, with some cups exhibiting over-extraction bitterness and others lacking depth. Mechanical brewing, with its automated control, exhibited a more uniform extraction time, resulting in a consistent flavor profile across samples.

Water temperature was another pivotal variable under scrutiny. Manual brewers often faced challenges maintaining a stable temperature throughout the brewing process, leading to fluctuations that impacted taste. Mechanical devices, equipped with precise temperature controls, mitigated this issue, ensuring a more stable and controlled extraction.

Grind size, a factor integral to coffee extraction, demonstrated notable distinctions between the two methods. Manual brewers, reliant on personal judgment, occasionally produced inconsistent grind sizes, affecting extraction uniformity. Mechanical brewing, with programmable settings, consistently maintained the desired grind size, contributing to a more even extraction and balanced flavor.

Taste tests and sensory evaluations played a central role in our analysis. Participants consistently reported a subjective preference for the unique characteristics of manual brewing, appreciating the hands-on, artisanal aspect. The nuanced flavors achieved through manual methods, while sometimes unpredictable, appealed to those who valued the craft of coffee preparation. In contrast, mechanical brewing garnered praise for its reproducibility and efficiency, particularly among those who prioritized consistency in flavor.

The overall user experience emerged as a significant factor in the comparison. Manual brewing enthusiasts highlighted the ritualistic and meditative aspects of the process, emphasizing the personal connection to each cup. Mechanical brewing, while lacking the hands-on engagement, offered a convenient and time-saving alternative that appealed to individuals with a busy lifestyle.

Now, let us discuss about **the outcomes in a V60 coffee by using different grind size ,temperature and brew time Analyzing the outcomes of V60 coffee based on grind size, temperature, and brew time** involves a nuanced exploration of texture, aroma, taste, and color. These factors intertwine to

create a sensory experience that can be finely tuned through precise adjustments in the brewing process.

- **Grind Size:** The grind size significantly impacts the texture and taste of V60 coffee. A coarser grind generally results in a lighter, more textured brew. The water passes through the grounds more quickly, extracting fewer solids, leading to a distinct mouthfeel. On the other hand, a finer grind yields a richer, fuller-bodied coffee with a smoother texture. This is due to a slower extraction process, allowing more compounds to dissolve into the cup.

The aroma is also influenced by the grind size. Coarser grinds tend to release more subtle, fruity notes, while finer grinds may enhance the intensity of the coffee's fragrance, often accentuating the bean's inherent characteristics.

- **Temperature:** Brewing temperature plays a pivotal role in the overall flavor profile. Higher temperatures, typically between 200-205°F, can extract more soluble compounds from the coffee grounds, resulting in a bolder taste. However, excessive heat can also lead to undesirable bitter notes.

Lower temperatures, around 195-200°F, can produce a milder cup, preserving delicate flavors. This is particularly beneficial for beans with intricate tasting notes that might be overshadowed by higher temperatures.

The color of the coffee can serve as a visual indicator of temperature effects. Warmer brews tend to exhibit a deeper, darker hue, while cooler temperatures may result in a lighter, more translucent appearance.

- **Brew Time:** The duration of the brewing process is another critical factor. Shorter brew times, typically 2-3 minutes, often yield brighter, more acidic coffees. This is because the water has less time to extract compounds that contribute to a heavier body.

Conversely, extending the brew time, say to 4 minutes or more, can produce a fuller-bodied cup with heightened richness. However, there is a delicate balance, as excessively long brew times can lead to over-extraction, introducing bitterness and astringency.

The aroma is intricately tied to brew time, with a longer extraction period intensifying the fragrance. Extended brew times also contribute to a deeper color, reflecting the increased extraction of soluble compounds.

- **Texture:** Texture, a tactile aspect of the coffee-drinking experience, is profoundly influenced by grind size and brew time. Coarser grinds and shorter brew times often result in a lighter, more refreshing texture, reminiscent of teas. On the contrary, finer grinds and longer brew times contribute to a velvety, full-bodied texture, akin to some medium to dark roast coffees.



- **Aroma:** Aroma, the first encounter with the coffee, is shaped by all three factors. The grind size determines how readily the volatile compounds are released, the temperature affects the intensity, and the brew time amplifies or moderates these aromatic notes. A well-balanced combination can result in a complex and inviting aroma, enhancing the overall sensory experience.
- **Taste:** The ultimate goal of any brewing method is to achieve a satisfying taste. Grind size, temperature, and brew time collectively contribute to the flavor profile. Experimenting with these variables allows for the customization of taste - from bright and fruity to rich and chocolatey. Finding the right balance is subjective and depends on personal preferences.
- **Color:** The color of the brewed coffee serves as a visual cue to the extraction process. Lighter colors may indicate a gentler extraction, while darker hues suggest a more robust and thorough extraction.

7. CONCLUSION

About Manual vs. Mechanical Brewing in V60

Manual and mechanical brewing methods represent two distinct approaches to crafting the perfect pour-over V60 coffee. Manual brewing offers a hands-on, personalized experience, allowing the brewer to control factors like pouring technique and flow rate. Mechanical brewing, on the other hand, introduces consistency through automated processes, potentially impacting the reproducibility of results.

To evaluate these differences, our study will assess various parameters, including flavor profiles, extraction efficiency, and overall quality. The goal is to understand not only the sensory aspects of the brewed coffee but also the practical implications of choosing one method over the other.

And about the Impact of Grind Size, Temperature, and Brew Time Grind size, temperature, and brew time are crucial variables that significantly influence the characteristics of pour-over V60 coffee. The second objective of this research is to unravel the intricate relationship between these variables and the final outcomes.

Grind size plays a pivotal role in determining the rate of extraction and, consequently, the flavors present in the coffee. By experimenting with different grind sizes, we aim to identify the optimal setting that enhances the overall quality of the brew.

Temperature is another critical factor, affecting the solubility of coffee compounds during brewing. Our study will explore how variations in temperature, within a specified range, impact flavor extraction and contribute to the sensory profile of the V60 coffee.

Brew time, the duration over which water interacts with coffee grounds, is a variable that can be adjusted to achieve desired strength and taste. Through systematic adjustments in brew time, we intend to uncover the ideal duration for extracting the desired flavors while avoiding undesirable characteristics.

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8. REFERENCES

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3. *Metabolism of Caffeine and Other Components of Coffee Maurice J. Arnaud Nestec Ltd., Nestlé Research Centre, CH-1000 Lausanne 26, Switzerland.*
4. *Extraction of caffeine from Robusta coffee (Coffea canephora var. Robusta) husks using supercritical carbon dioxide J. Tello, M. Viguera, L. Calvo Department of Chemical Engineering, Universidad Complutense de Madrid, 28040 Madrid, Spain.*