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Characteristics of Chemical Components and Organoleptic Test of Cinnamon Leaf Tea against Differences in Drying Temperature

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Abstract The main objective of this study was to investigate the influence of varying drying temperatures on cinnamon leaves, examining their chemical composition and sensory qualities in the production of cinnamon leaf teas, ultimately identifying the most suitable drying temperature for achieving enhanced chemical components and sensory attributes. This research adopted an experimental design involving four treatments (A = drying at 60 ℃, B = drying at 70 ℃, C = drying at 80 ℃, D = drying at 90 ℃) with three replications. The findings revealed that the drying temperature significantly influenced the chemical and sensory properties of the resulting cinnamon leaf tea. Specifically, the most favorable drying temperature identified was 60 ℃ for 370 minutes, yielding the best chemical components and sensory attributes. This temperature setting resulted in a total polyphenol content of 8.2%, an IC50 value of 67.74 ppm, a moisture content of 4.51%, an ash content of 3.29%, and a yield of 47.91%. In terms of sensory evaluation, the tea exhibited a color rating of 4.2 (liked), aroma at 3.8 (ordinary-like), and taste at 3.52 (ordinary-like). The application of a lower temperature (60 ℃) during the drying process is suggested as an optimal method for drying cinnamon leaves based on these findings. This study's outcomes serve as a fundamental reference for further research exploration into cinnamon tea as a natural beverage, offering insights into its production and potential uses.

Keywords Cinnamon, Leaf, Tea, Temperature, Quality

1. Introduction

Cinnamon is a spice plant considered as one of the export commodities of Indonesia and supplies 45% of the world's cinnamon production. The plant is widely planted in West Sumatra as local plantation, becoming a source of the community's economy. West Sumatra is a producer and exporter of dried cinnamon bark (cassiavera) of the *Cinnamomum burmannii* which reached 2,397 tons, setting the sector's domination over other agricultural products [1]. This study aims to examine how varying drying temperatures impact the chemical constituents and sensory evaluations of cinnamon leaf teas. The specific goals include: 1) Identifying the best drying temperature for cinnamon leaf teas based on levels of chemical compounds like flavonoids, tannins, saponins, phenolics, alkaloids, steroids, and glycosides; 2) Determining the ideal drying temperature for cinnamon leaf teas concerning sensory attributes like taste, aroma, and color.

While cinnamon bark has found widespread usage, particularly as a spice, it is imperative to optimize the utilization of cinnamon leaves, given their richness in beneficial chemical compounds. Cinnamon leaves have been identified to contain various compounds, including flavonoids, tannins, saponins, phenolics, alkaloids, steroids, and glycosides, as evidenced by phytochemical testing of cinnamon leaf extract (Cinnamomum burmannii) [2]. Alkaloids, among these compounds, are associated with providing a refreshing sensation. The principal polyphenol compound found in cinnamon leaves, trans-cinnamaldehyde, is known for its ability to lower blood sugar levels and reduce body fat [3]. Furthermore, the content of essential oils and active substances in cinnamon leaves such as polyphenols, flavonoids, saponins, and tannins in cinnamon leaves act as antibacterial agents, effectively inhibiting the growth of pathogenic microbes like Escherichia coli and Staphylococcus aureus [4].

The extensive range of bioactivities present in cinnamon essential oil contributes to its broad applications across pharmaceutical and food industries. These bioactivities encompass diverse functionalities, including antioxidant, anti-inflammatory, antidiabetic, hypolipidemic, cardioprotective, neuroprotective, anticancer, immunomodulatory effects, among others [5]. Furthermore, cinnamon is recognized for its notably high antioxidant content [6], and even its wasted leaves have exhibited the presence of 101 small molecules, comprising phenolic acids, terpenoids, lactones, flavonoids, and lignans [7]. Hence, due to these attributes, cinnamon leaves serve as a promising source for generating bioactive extracts and can be effectively utilized in the production of functional cinnamon leaf teas.

The production of cinnamon leaf tea aims to provide convenience to consumers so that it can be used as a healthy drink. The cinnamon leaf tea processing method generally refers to the processing of Camellia sinensis green tea, in which the withering stage is carried out to inactivate the polyphenol oxidase enzyme. Another stage of tea processing is drying. In tea processing, drying plays a pivotal role in halting enzymatic reactions, crucial for attaining the desired taste and color profile in the tea [8]. Among the various factors, temperature stands out as the primary influencer affecting chemical reactions during the drying phase. This variable has the potential to alter the composition of compounds and aroma in green tea, thereby leading to the development of distinct green tea aromas [9]. Higher drying temperatures tend to increase green tea's bitterness and astringency. Furthermore, higher temperatures have been shown to influence the antioxidant capacity, phenol levels, and flavonoid content of tea [10].

2. Materials and Methods

2.1. Material

The primary materials utilized in this research comprised fresh cinnamon leaves, specifically sourced to ensure cleanliness and freedom from insects or caterpillars. These green-hued leaves which were located in the 3rd and 4th order of the shoot and were classified as mature leaves were obtained from Limau Manis Village, Padang.

2.2. Research Design

This study employed an experimental research approach involving four distinct treatments, each replicated three times. These treatments focused on variations in the drying temperature applied to cinnamon leaves, encompassing:

A = Drying cinnamon leaves at 60 ℃
B = Drying cinnamon leaves at 70 ℃
C = Drying cinnamon leaves at 80 ℃
D = Drying cinnamon leaves at 90 ℃

2.3. Producing Cinnamon leaf tea

The procedure for preparing cinnamon leaf tea involved several steps: initially, the cinnamon leaves were gathered, weighed meticulously using an analytical balance, and then washed thoroughly to eliminate any adhering dirt. Subsequently, the leaves were subjected to an initial drying phase at 70 ℃ for 5 minutes within an oven, followed by size reduction using a blender. Afterward, the leaves underwent successive drying stages at temperatures of 60 ℃, 70 ℃, 80 ℃, and 90 ℃ until reaching a moisture content range of 4-5%. The deviation from the control temperature was tolerating for ± 2 ℃. The criteria for this phase included observing the leaves' transition to a yellowish-green hue and their characteristic crackling when compressed, while recording the duration for each drying treatment. Finally, the prepared cinnamon leaf tea was packaged into LDPE plastic pouches and stored in a hermetically sealed container containing silica gel to uphold the product's moisture levels.

2.4. Observation

The evaluation of the raw material included assessing moisture and ash content following the AOAC [11] guidelines, alongside determining total polyphenols and antioxidant activity [12]. Analysis of the cinnamon leaf tea products involved examining moisture and ash content [11], calculating yield, conducting phytochemical assays (targeting tannins, alkaloids, flavonoids, saponins, steroids, terpenoids) [13], evaluating antioxidant activity and total polyphenols [12], investigating toxicity [14], and performing microbial inhibition tests using the disc diffusion Kirby and Bauer method [15]. Additionally, the preparation of cinnamon leaf tea involved an organoleptic test [16]. For each determination, the sample used was in the range of 1-2 gram. The experiment was conducted at least triplicates. All collected data underwent processing and analysis utilizing MS Excel 2010.

3. Results and Discussion

3.1. Raw Material Analysis

The examination of the raw material involved evaluations of moisture and ash content, antioxidant activity, and total polyphenols. Table 1 showcases the results obtained from this analysis of the raw material.

Table 1. Raw Material Analysis (Cinnamon leaves)

Analysis	Result
Moisture content (%)	53.61 ± 0.56
Ash content (%)	1.97 ± 0.16
IC50 (ppm)	207.58 ± 1.78
Total polyphenols (%)	2.39 ± 0.02

Table 1 illustrates that the moisture content within fresh cinnamon plant leaves (Cinnamomum burmannii) measured at 53.61%, while the ash content was determined to be 1.97. The assessment of moisture content aimed to quantify the water present in fresh cinnamon leaves, whereas ash content serves as an indicator of mineral concentration within a substance.

The IC50 value (inhibitory concentration) signifies the sample concentration required to neutralize 50% of free radicals. The concentration of sample to neutralize the free radicals was considered as ppm. In this study the free radical was 2,2-diphenyl-1-picrylhydrazyl (DPPH). A lower IC50 value denotes higher antioxidant potency. If the IC50 value falls below 50 ppm, it is considered potent; between 50-100 ppm, it is strong; 100-250 ppm is moderate, and 250-500 ppm is considered weak [17]. For this study, fresh cinnamon leaf samples were dissolved in methanol at a concentration of 1000 ppm, then diluted into four varying concentrations to determine the IC50 value using a regression curve. The results of the IC50 evaluation for fresh cinnamon leaves yielded 207.57 ppm, indicating a moderate level of antioxidant potency. Notably, this IC50 value is comparable to the IC50 value of Camellia sinensis clone 100, one of the finest commercial tea leaves from Iran, which recorded 218.25 ppm [18]. The total polyphenol content in cinnamon leaves was determined using the Folin Ciocalteu method, yielding a measurement of 2.39%.

3.2. Cinnamon Leaf Tea Product Analysis

3.2.1. Moisture Content

Moisture content plays a crucial role in powders, impacting viscosity, storage stability, and several other properties. Higher moisture levels can disrupt hydrogen bonds between particles, ultimately decreasing the fluidity of the powder [19,20].

In this study, different drying times were used for each treatment to achieve drying results with the same moisture content, which was 4 - 5%, so that the results of chemical and organoleptic analysis carried out on cinnamon leaf tea products were in a balanced state or in the same moisture content. The moisture content value of cinnamon leaf tea is shown in Figure 1.

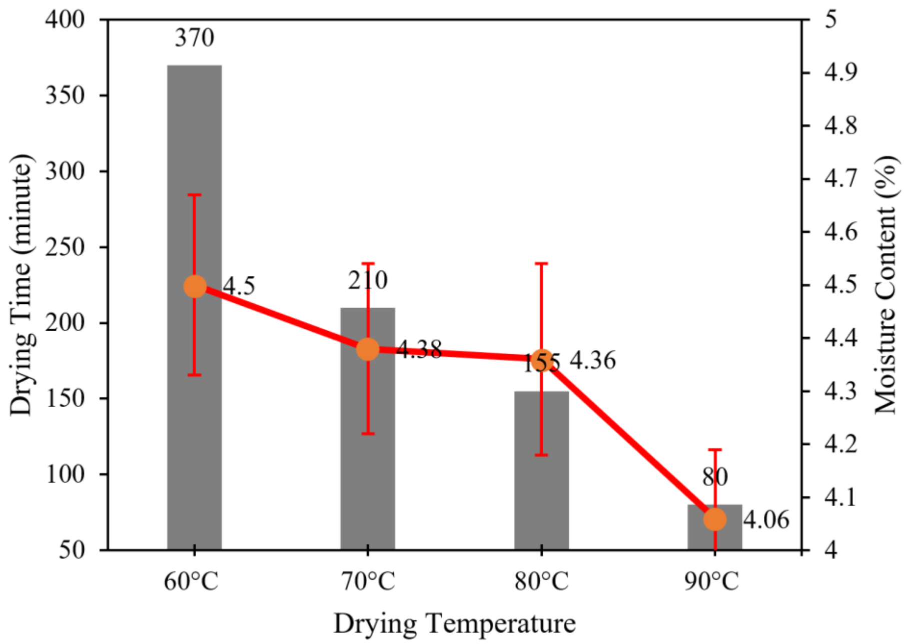

Figure 1. Moisture content of cinnamon leaf tea

Figure 1 illustrates that the moisture content of the produced cinnamon leaf tea ranges between 4.06% and 4.50%. As per the guidelines outlined in SNI 3836 [21] for dry tea quality requirements, the maximum acceptable moisture content is 8%. Therefore, the cinnamon leaf tea produced aligns with the established standards. The process of drying cinnamon leaf tea to achieve a moisture content of 4-5% involves varying durations under different temperature treatments.

The objective of drying cinnamon leaves is to create consumable products with minimal moisture content to prevent spoilage and ensure an extended shelf life. Higher moisture levels create a neutral environment conducive to bacterial growth and support metabolic processes that facilitate bacterial proliferation. It's been noted that maintaining a low moisture content (around 2.8 – 3%) can prevent bacterial growth and enhance the tea's shelf life [8]. In the tea-making process, the drying rate and precise determination of the moisture content at each stage significantly impact the tea's quality, influencing the leaf's shape, color, aroma, and taste, as well as the resulting drink's color [22].

3.2.2. Ash Content

Ash content is a vital indicator of the mineral composition in a material or product, which can significantly vary in type and quantity due to genetic and environmental factors in agricultural products. The evaluation of ash content is closely tied to the mineral composition within a substance [23]. Figure 2 showcases the average ash content values specifically for cinnamon leaf tea.

According to Figure 2, the ash content of cinnamon leaf tea ranged from 3.29% to 3.96%. Elevated drying temperatures correlated with higher ash content in cinnamon leaf tea. This increase can be attributed to the reduction in water content within the cinnamon leaf tea powder, resulting in a higher percentage of ash content. The minerals found in cinnamon include iron (Fe), zinc (Zn), calcium (Ca), chromium (Cr), manganese (Mn), magnesium (Mg), and phosphorus (P) [24]. When compared to black tea from Bangladesh [25], there are slight differences in their mineral content, specifically in terms of N, P, K, Ca, Na, and Fe.

The analysis results of the ash content of cinnamon leaf tea have fulfilled the SNI [21] tea quality requirements, namely a maximum of 8%. According to Chung et al. [26], a positive relationship exists between ash content and maintaining tea quality and suggested that the ash content should be controlled to less than 5.54% to maintain better tea quality during storage.

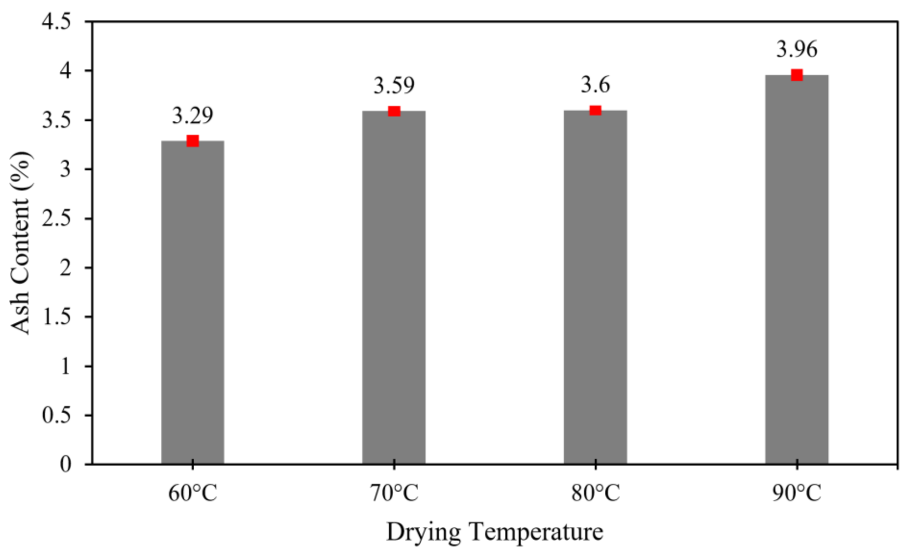

Figure 2. Ash content of cinnamon leaf tea

3.2.3. Yield

The yield value is computed by comparing the weight of the resulting cinnamon leaf tea product to the total weight of the initial fresh leaves processed in the dryer, presented as a percentage. This calculation serves the purpose of assessing the efficiency of the entire process employed. The average yield of cinnamon leaf tea can be seen in Figure 3.

The average yield of cinnamon leaf tea observed in this study exceeded that of Camellia sinensis tea, which was recorded at 23%. This difference can be attributed to the lower moisture content found in cinnamon leaves when compared to tea leaves. Specifically, fresh cinnamon leaves contain 53.61% moisture, whereas according to Jabeen et al. [27], fresh tea leaves exhibit a moisture content of 76.4%.

The yield analysis conducted during this research revealed a reverse correlation between the drying temperature applied and the resultant product yield. As highlighted in the study by Ismiyati et al. [28], drying time correlates with moisture content, significantly influencing the final yield. Elevated drying temperatures applied to cinnamon leaves led to reduced moisture content, subsequently causing lower product yields. This outcome occurs due to the evaporation of moisture content within the material, resulting in a decrease or contraction in the material's overall weight.

3.2.4. Phytochemical, Antioxidants and Polyphenol

Phytochemical compounds are bioactive compounds widely found in plants and are known to have an active role in preventing several diseases [29]. This study identified six types of phytochemical compounds that are thought to be present in cinnamon leaf tea. This phytochemical analysis was carried out qualitatively. The findings from the phytochemical analysis are presented in Table 2.

Table 2. Yield of Phytochemical Analysis of Cinnamon leaf tea

Phytochemical	Yield (%)
Alkaloid	+
Tannin	+
Saponin	-
Flavonoid	+
terpenoids	+
Steroid	+

Note: (+): contained in cinnamon leaf tea, (-): not contained in cinnamon leaf tea

The tests confirmed the presence of alkaloid compounds in cinnamon leaf tea, particularly identifying isoquinoline among the alkaloids within cinnamon leaves [30]. Qualitative analysis using a $FeCl_3$ solution verified the existence of tannins in cinnamon leaf tea. Additionally, Cinnamomum burmannii was found to contain condensed tannins, specifically proanthocyanidins and catechins [31].

Saponins, characterized by their foaming properties, underwent examination through a shaking process. However, the produced foam in this study dissipated quickly and was minimal, leading to the conclusion that cinnamon leaf tea did not contain saponins. According to Heng [32], saponins maintain stability in water at temperatures below 30 ℃ for 75 minutes. At 40 ℃, a slight decrease in saponin concentration occurred, but temperatures above 40 ℃ notably diminished saponin concentrations. In this study, cinnamon leaves underwent two heating processes: initial withering at 70 ℃ for 10 minutes followed by subsequent drying at various temperatures (60 ℃, 70 ℃, 80 ℃, and 90 ℃) based on treatment conditions.

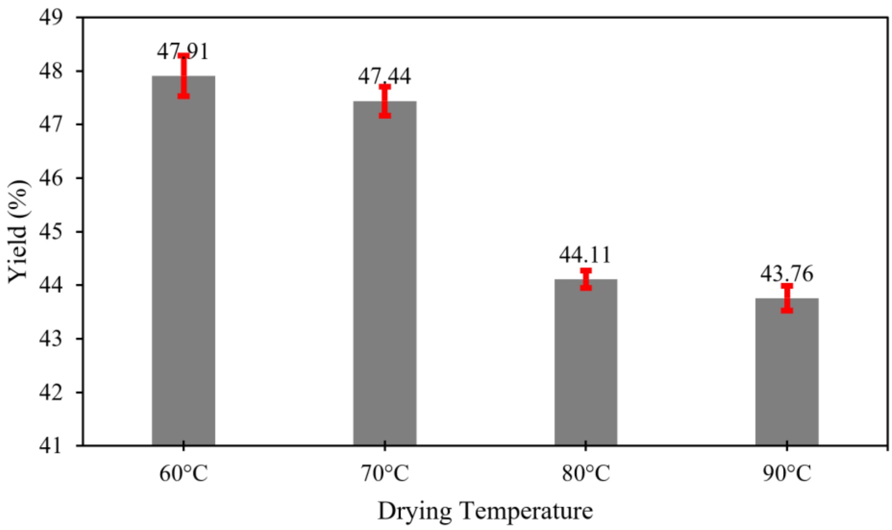

Figure 3. Yield of cinnamon leaf tea

Jabeen et al. [27], stated that the flavonoid compounds found in cinnamon leaves were 18.76 μg/g quercetin and 0.044 μg/g kaempferol. Terpenoid compounds contained in cinnamon leaves are cineol, terpineol, pinene, cinnamaldehyde, eucalyptol, and eugenol [30]. This compound is a compound that makes up the essential oil in cinnamon leaves. Antioxidants are compounds that function to delay or prevent oxidative damage [33]. Antioxidant analysis of cinnamon leaf tea was expressed quantitatively with IC50. The IC50 value is commonly used to express the intensity or level of antioxidant activity of a test substance using the DPPH free radical scavenging method.

Cinnamon leaf tea samples were dissolved in methanol to a concentration of 10,000 ppm for a drying temperature treatment of 60 ℃, 70 ℃ and a concentration of 1,000 ppm for a drying temperature treatment of 80 ℃, 90 ℃. Then the samples were diluted into four concentration variations: 12.5 mg/ml, 25 mg/ml, 37.5 mg/ml, and 50 mg/ml. The aim was to determine the IC50 value with a regression curve. The results of the IC50 analysis of cinnamon leaf tea can be seen in Figure 4.

The IC50 value of fresh cinnamon leaf raw material is included in the medium group, namely 207.58 ppm. Cinnamon leaves processed into cinnamon leaf teas produce lower IC50 values, ranging from 65.32 ppm to 115.66 ppm. These results indicate an increase in the antioxidant intensity of cinnamon leaves after being processed into cinnamon leaf tea from weak to a higher level. This is because the drying process of cinnamon leaves reduces the moisture content in cinnamon leaf teas by up to 4-5% and causes an increase in the percentage of the remaining ingredients, one of which is the antioxidant component. In addition, cinnamon leaves have an active component as an antioxidant that comes from the phenol group and is easily degraded as the drying temperature increases.

Raising the temperature during heating disrupts interactions within the matrix between the analyte and the sample, impacting hydrogen bonds, Van der Waals forces, and dipole interactions. This disruption enhances the diffusion of the analyte into the solvent medium, leading to an increased extraction yield [34]. The IC50 value serves as an indicator of a compound's antioxidant potency, with a lower IC50 value signifying a stronger antioxidant capacity [17].

The data in Figure 4 reveals shifts in the antioxidant potency of cinnamon leaf tea: a decrease at drying temperatures of 70 ℃ and 80 ℃ followed by an increase at 90 ℃. This fluctuation can be attributed to the vulnerability of antioxidant compounds to alterations, where temperature is acknowledged as a contributing factor to the decline in antioxidants. Antioxidants are susceptible to high temperatures: high temperatures and prolonged drying cause chemical components to be easily oxidized, reducing antioxidant activity. At 90 ℃, there was an increase in antioxidant intensity. This was due to the shorter drying time. Even though using a higher temperature, the time used in this drying was shorter than other drying temperatures. The shorter oxidation process makes the chemical components contained in cinnamon leaves maintained.

Tea processing is significantly impacted by both temperature and the duration of the drying process. Higher temperatures accelerate drying, while lower temperatures prolong this phase. Exposure to heat can expedite the oxidation of antioxidants present in the material, resulting in diminished antioxidant activity [35]. A longer extraction process is linked to decreased antioxidant activity, especially as temperatures rise. The correlation between temperature and drying time significantly influences antioxidant activity. This effect is largely due to the drying process, which may compromise the integrity of active substances inherent in food ingredients.

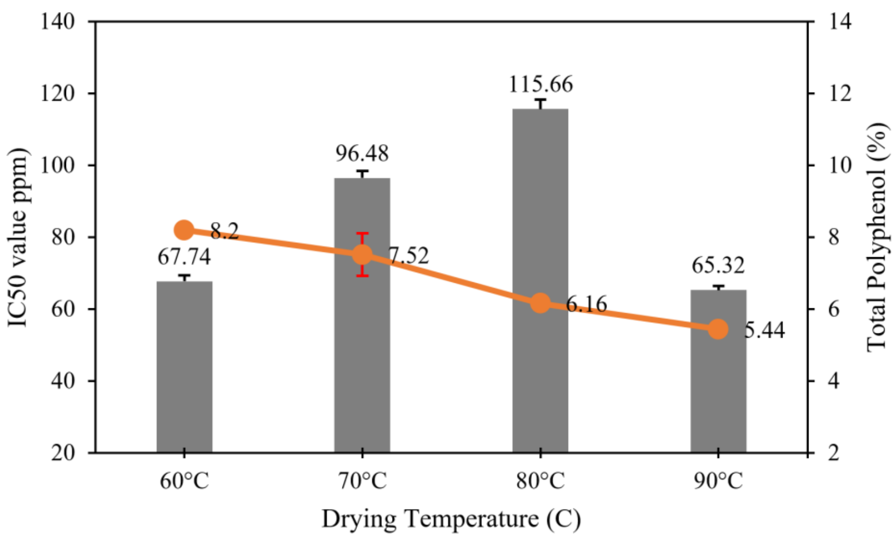

Figure 4. Antioxidant (IC_{50} Value) and Polyphenol of Cinnamon leaf tea

The drying process reduces the moisture level to 4-5% and concentrates the remaining elements, including polyphenols, resulting in a higher total polyphenol concentration in cinnamon leaf tea than in fresh cinnamon leaves. Alhaithloul et al. [32] noted that increased extraction time and temperature correlate with higher levels of total polyphenols and total flavonoids. The average total polyphenol content in cinnamon leaf tea ranged from 5.44% to 8.2%. The highest polyphenol concentration was observed at a drying temperature of 60 ℃, whereas the lowest was noted at 90 ℃. Notably, in compliance with SNI 3836 regulations for dry tea quality requirements, which stipulate a minimum tea polyphenol content of 5.2%, the produced cinnamon leaf tea meets these standards [21]. Higher drying temperatures prompt the release of bound polyphenols, causing a reduction in polyphenol content as the drying temperature increases. Furthermore, cell damage during processing contributes to the release of phenolic compounds from the material, thereby reducing the polyphenol content in the resulting product.

3.2.5. Microbial Inhibition

A visible clear zone surrounding the paper disc indicated the tea's inhibition of bacterial growth. Escherichia coli was used for this measurement. This clear zone represents the diffusion area where the tea's brewed components influence bacteria growth. The findings regarding the microbial inhibition analysis of steeped cinnamon leaf tea are presented in Table 3.

Table 3. Microbial inhibition of cinnamon leaf tea

Drying temperature (℃)	Inhibition diameter (mm)
60	4.67 ±0.57
70	4.33 ±0.57
80	3.67 ±0.57
90	3.67 ±1.15

The analysis results on the microbial inhibition related to cinnamon leaf tea showed a range from 3.67 to 4.67 mm. The development of a diameter in the inhibition zone signifies the antibacterial efficacy of cinnamon leaf tea. According to Davis and Stout [36], the grading of antibacterial effectiveness, determined by the diameter, falls into four categories: over 20 mm denotes very strong antibacterial activity; 10-20 mm represents strong activity; 5-10 mm indicates moderate activity; and less than 5 mm suggests weak activity. The results of the microbial inhibition analysis in this study were classified as weak, as the assessment utilized steeped cinnamon leaf tea.

Cinnamon leaf tea's capability to impede microbial growth is attributed to its constitution of essential oils and phytochemical compounds such as alkaloids, tannins, flavonoids, triterpenoids, and steroids. Flavonoid compounds can form complexes with extracellular proteins, causing damage to bacterial cell walls and leading to the release of intracellular components [37]. Tannins demonstrate antibacterial activity by deactivating microbial cell adhesion, disrupting enzymes, and interfering with protein transport within cell layers [34]. Moreover, the primary component of cinnamon leaf essential oil, Cinnamaldehyde, exhibits antibacterial properties by impairing bacterial cell surfaces [38], inhibiting the activity of amino decarboxylase enzymes, and binding to cellular proteins, thereby disrupting their normal function [39].

3.2.6. Toxicity

This study used the Brine Shrimp Lethality Test (BSLT) method to determine the toxicity of a methanol extract obtained from cinnamon leaf tea, with Artemia salina Leach larvae serving as the test organism. Artemia is especially sensitive to changes in environmental conditions, making it an appropriate first indicator for assessing chemical toxicity effects. The number of LC50 larvae fatalities was calculated using probit analysis. The LC50 (lethal concentration) is the concentration at which 50% of the test organisms die within a given time frame. LC50 measures total mortality rather than specific organ damage, making it appropriate for short-term studies. It helps to evaluate Artemia's mortality rate because of its simple digestive system and increased sensitivity [40]. Details of the LC50 value for cinnamon leaf tea are provided in Table 4.

Table 4. LC 50 value of toxicity of cinnamon leaf tea

Drying temperature (℃)	LC50 value	Remarks
60	31246,4	Non toxic
70	3883,55	Non toxic
80	31246,4	Non toxic
90	31246,4	Non toxic

Based on toxicity standards for plant compounds, toxicity levels are classified into three categories: a very toxic classification is when the LC50 value is <30 ppm, while an LC50 value between 31 ppm and 100 ppm is deemed toxic, and an LC50 value exceeding 1000 ppm is considered non-toxic [41]. In this study, cinnamon leaf tea exhibited no toxic properties, as indicated by its LC50 value of 31,246.40 at drying temperatures of 60 ℃, 80 ℃, and 90 ℃. However, at a drying temperature of 70 ℃, the LC50 value was 3883.55. Therefore, based on these findings, cinnamon leaf tea can be deemed safe for consumption due to its lack of toxic properties.

3.2.7. Organoleptic Test

The brewing of cinnamon leaf tea yields a distinctive cinnamon aroma, color, and taste. The preferred attributes of the cinnamon leaf tea products, as indicated by the panelists, are depicted in the organoleptic radar chart provided in figure 5.

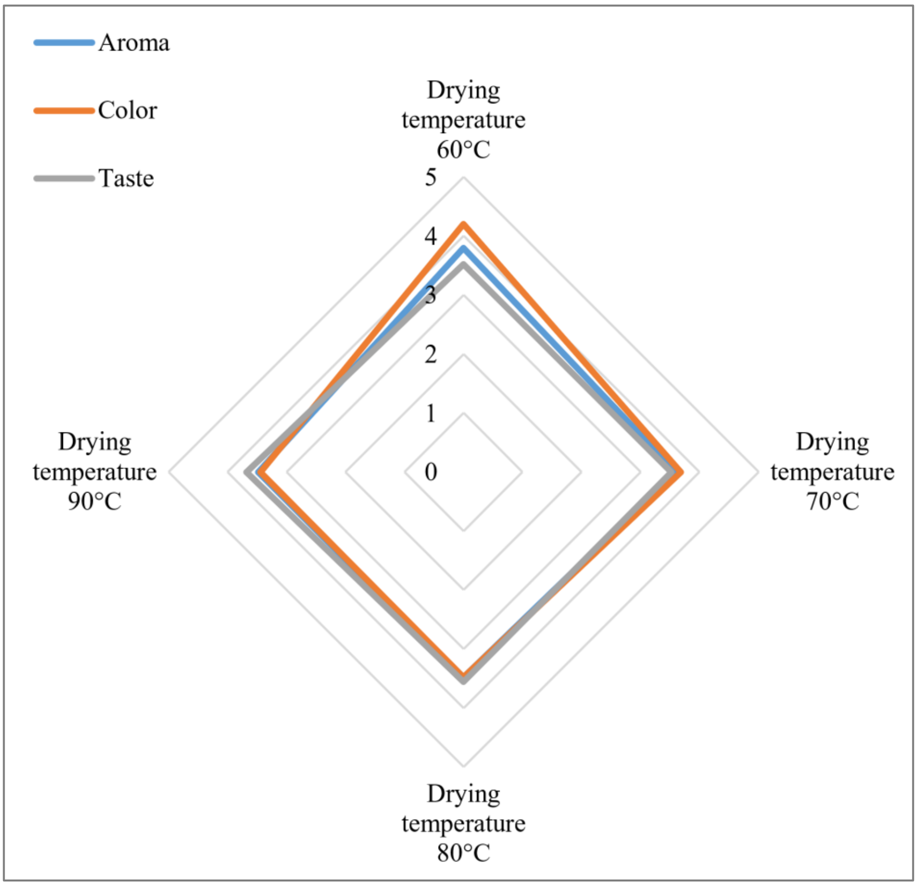

Figure 5. Radar chart of organoleptic test of cinnamon leaf tea

Cinnamon leaves are high in essential oils, particularly trans-Cinnamaldehyde (87.32%), 3-methoxy-1,2-propanediol, eugenol, and 5-(2-propenyl)-1,3-benzodioxole, which are important bioactive substances with disease-preventive properties [42,43]. Panellists rated aromas on a scale from ordinary (3) to liked (4). The panellists' favourite scent was cinnamon leaf tea dried at 60 ℃, which received a score of 3.8. Higher drying temperatures, on the other hand, resulted in a lower preference for scent due to reduced aromatic characteristics in cinnamon leaves caused by the raised drying temperatures. Temperature has a significant impact on the scent and flavour of green tea during processing [44]. As water evaporates from the food's surface during drying, volatile chemicals such as the essential oil found in cinnamon leaves are transported away.

The cinnamon leaf tea obtained had a brownish-green tint. The colour change from cinnamon leaves to tea is due to the drying process, which uses high temperatures and destroys the chlorophyll in the leaves. The brewed tea had a brownish-yellow colour. Panellists' acceptance of the colour of cinnamon leaf tea ranged from normal (3) to liked (4). Higher drying temperatures were linked to lower consumer acceptability of the tea's colour, owing to a darker brew induced by chlorophyll degradation. Chlorophyll molecules are liberated from protein complexes during plant tissue drying, which promotes their conversion into pheophytins when exposed to heat. Pheophytin is a kind of chlorophyll that lacks Mg^{2+} ions, resulting in a brownish-green colour [45].

Taste is a chemical sense that occurs in the mouth when chemicals interact with receptor cells [46]. The panellists' taste acceptability of cinnamon leaf tea ranged from 3.52 to 3.68, demonstrating a preference for a taste that was perceived as typical. Cinnamon leaf tea has an astringent taste, with greater drying temperatures resulting in higher organoleptic taste scores. The decrease in tartness in tea with increasing drying temperatures is due to the breakdown of tannin components, which cause the astringent flavour, under the action of heat.

The cinnamon leaf tea with the largest organoleptic radar area was the panellists' favoured product. According to Figure 1, the most popular product among the panellists was cinnamon leaf tea dried at 60 ℃, with an organoleptic scent score of 3.8, colour score of 4.2, and taste score of 3.52.

4. Conclusions

This research underscores the significant impact of drying temperature treatments on both the chemical composition and organoleptic attributes of resulting cinnamon leaf tea. Optimal processing conditions for cinnamon leaf tea, specifically at 60℃ for 370 minutes, yield the most favorable chemical and organoleptic components. These conditions produce cinnamon leaf tea with noteworthy characteristics, including a total polyphenol content of 8.2%, an IC50 value of 67.74 ppm, a moisture content of 4.51%, an ash content of 3.29%, and a yield of 47.91%. Furthermore, the organoleptic evaluations revealed a color rating of 4.2 (liked), an aroma score of 3.8 (ordinary-liked), and a taste rating of 3.52 (ordinary-liked). These findings highlight the importance of specific drying temperature parameters in optimizing the chemical and sensory qualities of cinnamon leaf tea.

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Data Availability Statement

The data that supports the conclusions drawn in this article is provided within the article itself.

Conflicts of Interest

The authors have stated that they do not have any conflicts of interest.

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