

Analysis of the Properties of Siglalón (*Vasconcellea stipulata*) and its Application in Bakery Products

*Análisis de las propiedades del siglalón (*Vasconcellea stipulata*) y su aplicación en productos de panificación*

 Asalia A. Cedeño-Zambrano¹  Kimberly H. López-López²  Bianca E. Salazar-Rodríguez¹

 Olanda E. Zea-Álvarez¹  Tatiana M. Poveda-Anchundia¹

tatiana.povedaanc@ug.edu.ec 

- 1.- Universidad de Guayaquil. Guayaquil, Ecuador
- 2.- Instituto Tecnológico Superior Vicente Rocafuerte. Guayaquil, Ecuador

Received: 09/20/2024 Reviewed: 09/29/2024 Accepted: 10/18/2024 Published: 01/10/2025

ABSTRACT

Siglalón (*Vasconcellea stipulata*) is considered a fruit of Colombian–Ecuadorian origin. In Ecuador, its geographical distribution is found in the provinces of Azuay, Loja, Cañar, and El Oro. According to taxonomic classification, the *Vasconcellea* genus includes twenty-one species. The application of *Vasconcellea stipulata* fruit in the field of baking arises from the limited knowledge about siglalón and its culinary use, as its consumption remains low in mountainous regions and surrounding areas. This culinary proposal focuses on incorporating siglalón into bakery products to take advantage of its nutritional properties. The organoleptic characteristics of this fruit provide significant benefits to baked goods. The methodology included three experimental trials involving four preparations, among which the custard cream was the most highly rated product, achieving an 85% acceptance rate. The organoleptic properties, such as aroma, color, taste, and texture, of the preparations were also characterized in Guayaquil. However, the lower scores obtained for samples (a) and (b) by the panelists were associated with the high tannin content in siglalón, resulting from the cooking technique used. This research demonstrates innovation in baking, showing that siglalón can be successfully incorporated into bakery products due to its culinary and nutritional value.

Keywords: Bakery, innovation, nutritional properties, siglalón.

RESUMEN

El siglalón es considerado una fruta de origen colombo ecuatoriano. Su distribución geográfica en el Ecuador se encuentra en las provincias de Azuay, Loja, Cañar y El Oro. De acuerdo con la clasificación taxonómica el género *Vasconcellea* contempla veintiuno



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Rev. Investigaciones ULCB. Jan - Jul.12(1), 2025; ISSN: 2409 - 1537;32-38

especies. La aplicación de la fruta de *Vasconcellea stipulata* dentro del ámbito de la panificación, se debe al escaso conocimiento sobre el siglalón y su uso en la gastronomía, debido a que su consumo es bajo en sitios montañosos y alrededores. La presente propuesta culinaria es la aplicación del siglalón en la panadería, para el aprovechamiento de las propiedades nutricionales. Las características organolépticas de esta fruta son de gran aporte para los productos panificados. En la metodología se establecieron 3 experimentaciones en cuatro preparaciones, de las cuales la crema pastelera fue el producto mejor valorado, con un 85 % de aceptación. Así también se caracterizaron las propiedades organolépticas de las preparaciones, como olor, color, sabor y textura en Guayaquil. Sin embargo, el puntaje bajo en las muestras (a) y (b) por parte de los panelistas están relacionadas con la alta presencia de taninos en el siglalón, debido a la técnica de cocción empleada. La presente investigación muestra la innovación en la panificación, demostrando que el siglalón puede ser incorporado exitosamente en productos de panadería por su valor culinario y nutricional.

Palabras clave: Panadería, innovación, propiedades nutricionales, siglalón.

INTRODUCTION

Despite being one of the smallest countries in South America, Ecuador possesses an extraordinary diversity of climate, flora, and fauna, making it an attractive region where most of the country's food products originate from its various ecosystems (Rodríguez *et al.*, 2013). Ecuadorian cuisine is known for its exotic flavors; however, many highly nutritious foods remain relatively unknown, and several that were once valued have now lost prominence. The fruits studied in this research have been affected by social and environmental changes—information gathered through interactions with residents of Sevilla de Oro, in the province of Azuay—where fruit consumption has decreased, and only a small number of crops remain (Vidal *et al.*, 2009).

Currently, there are no commercial products based on siglalón in Ecuador, although in the provinces of Loja, Azuay, and El Oro, fruit-based products such as jams, flavored waters, juices, and preserved fruits are produced. This limited development explains why siglalón remains unfamiliar to

most Ecuadorians, as confirmed by studies conducted in Guayaquil. Since the fruit is cultivated only on a small scale and lacks strong market demand, it has not yet been widely adopted in food production. The use of this fruit as a raw material in bakery products is therefore recommended.

The limited consumption of local foods among Ecuadorians is largely due to a lack of information in the media and to distribution challenges associated with regional variations in climate and soil conditions. The restricted availability of siglalón in uncultivated regions of the country represents a key factor in its low recognition and utilization (Espinosa & Abedini, 2016).

Based on observations from markets and supermarkets, siglalón is rarely consumed in coastal areas, in contrast to the highlands, where it is more commonly sold due to its Andean origin (Scheldeman *et al.*, 2007). Nevertheless, there is a shortage of processed products derived from this fruit. In northern South American countries such as Venezuela and Colombia, siglalón

is used to make preserves and jams through various techniques that yield nutritionally rich products (Auquiñivin & Paucar, 2020).

This study aims to identify the gastronomic applications of siglalón as part of innovative approaches in baking, as well as to encourage the consumption of a largely unknown fruit among Ecuadorians. The analysis will also benefit future culinary professionals by providing a foundation for developing new applications of this fruit in diverse areas of gastronomy (Scheldeman *et al.*, 2004).

According to León-Yáñez *et al.* (2011), the *Carica* genus includes a single species, whereas the *Vasconcellea* genus in Ecuador comprises eleven recognized species, five of which are endemic. Various publications have discussed this genus in Ecuador, noting that, due to the country's favorable climatic conditions, most species are classified as of "least concern" and are found primarily in the central and southern regions. Maintaining the cultivation and commercialization of the fruit and its derivatives is important, as it contains enzymatic compounds valuable for industrial product development (Luján *et al.*, 2021).

Currently considered an underutilized or neglected papaya variety, siglalón is typically grown in small-scale artisanal plantations, where producers value it for its unique properties. It is regarded as an "isolated" crop, not only due to its low yield but also because of its inefficient utilization—not just of the fruit itself but also of its secondary metabolites. As an Andean fruit tree, siglalón is produced in limited quantities; the lack of demand and inconsistent production hinder its inclusion in culinary applications (Cárdenas, 2021).

MATERIALS AND METHODS

Experimental trials were conducted to analyze the organoleptic properties of siglalón, resulting in three experimental tests. The ingredients used included siglalón, flour, eggs, sugar, yeast, butter, baking powder, and others. Equipment such as an electric oven, hand mixer, and balance scale were also employed.

For the first experiment, as shown in Table 1, a quatre-quarts (French pound cake) dough was prepared using 2% siglalón pulp. The second experiment involved the formulation of butter cookies with 1% butter, 1.5% sugar, 5% flour, and 1% siglalón pulp. Finally, the third experiment consisted of preparing a pastry cream as a bread filling, using 5% siglalón pulp, 1.5% egg yolks, and 0.5% cornstarch.

Each experimental process began with ingredient preparation. For the pound cake, the creaming method was applied (beating butter and sugar), followed by the gradual addition of eggs and siglalón pulp. Once combined, the dry ingredients were folded in gently, and the mixture was baked in an electric oven at 180 °C for 35 minutes.

For the butter cookies, siglalón pulp, butter, flour, and baking powder were mixed, and the dough was rolled out to a thickness of 0.4 cm. After resting for 15 minutes under refrigeration, the dough was cut into desired shapes and baked in an electric oven at 160 °C for 20 minutes.

In the final experiment, the pastry cream was prepared by infusing siglalón pulp with a vanilla bean. A portion of the pulp was reserved and used to dissolve the cornstarch. The egg yolks, sugar, and cor-

nstarch mixture were then combined with the infused milk to obtain a homogeneous cream.

A sensory evaluation was conducted using a hedonic scale to assess organoleptic attributes (color, aroma, taste, and texture) of the three experimental products. The scale ranged from 1 (“dislike”), 3 (“neither like nor dislike”), to 5 (“like

very much”). The evaluation was conducted with adult participants aged 28 to 60, who were informed about the study and provided their consent to participate. Each panelist received the hedonic scale form, a glass of water, and samples of the three products. Proper evaluation procedures and rating instructions were explained prior to testing. After completion, the data were collected and analyzed for interpretation.

Table 1.
Formulation of the experiments developed with Siglalón pulp

Experiment 1 Pound cake		Experiment 2 Butter cookies		Experiment 3 Pastry cream	
Ingredients	Quantity	Ingredients	Quantity	Ingredients	Quantity
Siglalón pulp	20 g	Siglalón pulp	30 g	Siglalón pulp	500 g
Flour	250 g	Flour	300 g	Sugar	125 g
Butter	250 g	Butter	30 g	Eggs	100 g
Eggs	250 g	Sugar	45 g	Vanilla pod	1 unit
Sugar	250 g	Vanilla essence	1 g	Cornstarch	
Vanilla essence	1 g	Baking powder	3 g		
Baking powder	5 g				

RESULTS AND DISCUSSION

In the analysis of species diversity, it is possible to determine the level of unfamiliarity and use of a fruit based on its history, stems, leaves, flowers, fruits, and nutritional value. To identify its characteristics, such as color, odor, flavor, and texture, an investigation was conducted, developing an important part of the aforementioned properties, which were incorporated into the development of this study.

Through sensory analysis, three samples corresponding to the experimental products were evaluated: the pound cake (sample a), the butter cookies (sample b),

and the pastry cream (sample c). Each product’s sensory attributes were assessed, and the pastry cream (sample c) received the highest preference, with an 85% acceptance rate, as shown in Table 2.

The high acceptance of sample (c) aligns with the findings of Salas (2021), who noted that tropical fruits often stand out for their pleasant flavor and potential for gastronomic innovation. However, the lower scores of samples (a) and (b) may be related to the high tannin content in siglalón, which can be influenced by the cooking technique used, as suggested by Ote-

ro-Lamas (2012), thereby affecting flavor acceptance.

The organoleptic evaluation revealed that siglalón has a high acceptance potential among consumers. The study developed several preparations incorporating

the fruit, all of which demonstrated favorable acceptance by the selected panelists. Furthermore, siglalón contributes to the absorption of papain, a digestive enzyme unique to fruits of the Caricaceae family (Lujan *et al.*, 2021).

Table 2.
Values Corresponding to the Analysis of Sensory Attributes in the Evaluated Experiments

Category	Sample (a)	Sample (b)	Sample (c)
Dislike	5%	20%	4%
Neither like nor dislike	15%	7%	11%
Like very much	80%	73%	85%
Total	100%	100%	100%

CONCLUSIONS

This research demonstrates innovation in bakery applications through the three developed formulations, pound cake, butter cookies, and pastry cream, showing that siglalón can be successfully incorporated into bakery products, highlighting its culinary and nutritional value.

The sensory evaluation results were positive, with the pastry cream being the most preferred product (85% acceptance). This demonstrates the potential of siglalón to attract consumers with its pleasant flavor and texture.

Although the preparations were well-received, improvements are recommended to reduce the tannin content in siglalón, as this could enhance attributes such as

color and flavor, thereby increasing overall acceptance.

From a gastronomic and cultural perspective, this study reinforces the importance of preserving and promoting siglalón cultivation—not only for its nutritional value but also as a resource for culinary innovation that can revitalize its consumption in Ecuador and beyond.

The incorporation of siglalón supports sustainability and biodiversity by promoting the recovery of underutilized fruits, contributing to agricultural diversity and sustainability. This opens opportunities for the development of new products and markets focused on traditional yet innovative foods.

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Author Contribution Statement

- Cedeño-Zambrano, A.: Conceptualization, methodology, writing, project administration.
- López-López, K.: Methodology; statistical analysis; writing; project administration.
- Salazar-Rodríguez, B.: Writing and project administration.
- Zea-Álvarez, O.: Review and editing.
- Poveda-Anchundia, T.: Review and editing.

Funding / Acknowledgments

This research article was self-funded by the authors.