



Fermentation and Properties of Cascara Wine

Chayathip Kattawong and Nopakarn Chandet

Division of Biochemistry and Biochemical Innovation

Department of Chemistry, Faculty of Science, Chiang Mai University

Corresponding author : nopakarn.c@cmu.ac.th

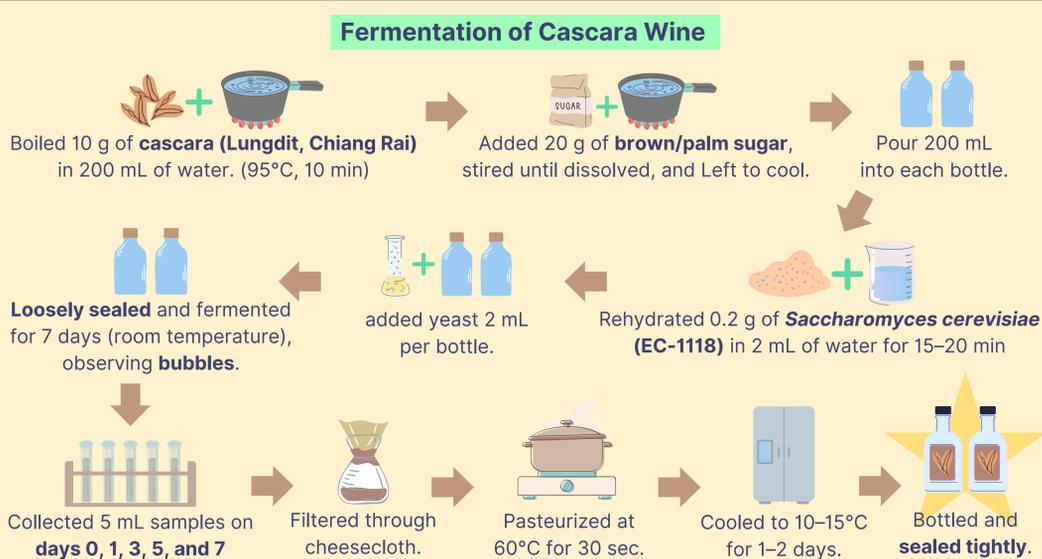


Abstract

Coffee pulp is a by-product of the coffee bean production process. It comprises many kinds of organic compounds. This project focuses on exploring the fermentation process and properties of wine made from cascara tea (coffee pulp tea), using different types and proportions of sugars, specifically brown sugar and palm sugar. The study involves preparing cascara tea by boiling 10 grams of coffee pulp in 200 milliliters of water with 20 grams of sugar at 95°C for 10 minutes. A starter culture is prepared by dissolving 0.2 grams of *Saccharomyces cerevisiae* EC-1118 Lalvin in 2 milliliters of sterilized distilled water at 25°C, allowing it to activate for 15-20 minutes. The prepared inoculum is then mixed with the cascara tea, and fermentation is carried out at room temperature (25°C) for 7 days. Samples are collected to analyze reducing sugars using the DNS method, ethanol content using Gas Chromatography (GC), and phenolic compounds using the Folin-Ciocalteu method. The results showed that wine fermented with palm sugar exhibited higher ethanol and phenolic compound content than wine fermented with brown sugar. The maximum ethanol concentration reached 7.70 (%v/v) in palm sugar wine compared to 5.54 (%v/v) in brown sugar wine. Similarly, the highest phenolic compound content in palm sugar wine was 17.11 mg GAE/mL, whereas brown sugar wine contained 13.67 mg GAE/mL. The reducing sugar concentration decreased over the fermentation period, reflecting efficient sugar utilization by yeast. The findings suggest that palm sugar promotes a faster and more efficient fermentation process than brown sugar. This study enhances the understanding of cascara wine fermentation and highlights its potential for commercial production, contributing to waste reduction in the coffee industry and increasing the economic value of coffee byproducts.

Keywords: Coffee Pulp, Husk, Cascara Wine, Cascara Tea, *Saccharomyces cerevisiae*, Fermentation, Value-added Products

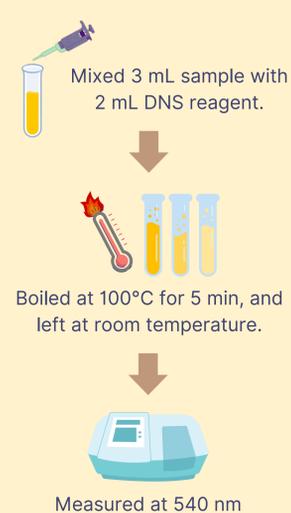
Methodology



Properties Analysis

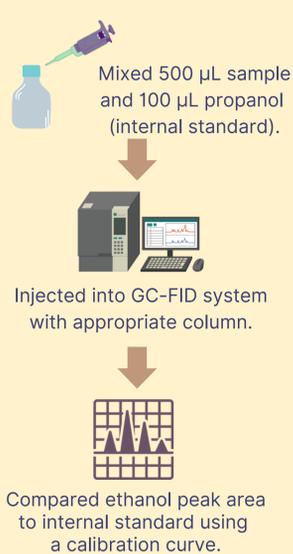
Reducing sugar content

DNS Method



Ethanol content

Gas Chromatography



Phenolic Compound Content

Folin-Ciocalteu Method



References

- Chalee Waradee. (2020). **From Coffee Husk to Premium Tea: The Rise of "Cascara"**. Available from <https://www.bangkokbiznews.com/lifestyle/906351>
- Chumpookam, J., Subnum, V., & Jaruwattanaphan, T. (2014). **Effect of component ratio on coffee pulp wine quality and consumer's satisfaction**. Khon Kaen Agricultural Journal, 42(Suppl. 3), (2557). Available from https://ag2.kku.ac.th/kaj/PDF.cfm?filename=L_011.pdf&id=16_05&keeptrack=712
- E Sholichah et al (2021). **Influence of native coffee yeast fermentation on phenolic content, organic acids, and volatile compounds in cascara**. IOP Conf. Ser.: Mater. Sci. Eng. 1011 012006. DOI 10.1088/1757-899X/1011/1/012006

Introduction



Figure 1: Cascara



Figure 2: Coffee Cherry

Cascara is the peel and pulp of coffee cherries left over after the separation of the beans. Traditionally, this byproduct was discarded in the coffee production process, but it has gained increasing attention as a component in fermented beverages such as cascara wine or cascara kombucha. Known for its low caffeine content, high antioxidant levels, and natural sweet flavor resembling dried fruits, honey, and spices, cascara's popularity has grown due to the expansion of the specialty coffee market, health-conscious trends, and a sustainability focus aimed at reducing waste in coffee production.

Objectives

- To produce cascara wine by batch fermentation
- To compare the fermentation of cascara wine using different carbon sources (brown sugar and palm sugar)
- To investigate some properties of cascara wine

Results & Discussion



Figure 3: Fermentation of cascara wine (brown and palm sugar)

Brown sugar

- sweeter taste, lower acidity, milder alcoholic aroma, moderate bitterness, and a reddish-brown color

Palm sugar

- less sweet but more acidic profile, a stronger alcoholic aroma, moderate bitterness, a darker brown color, and a higher level of bubble formation.

Comparisons between Reducing Sugar and Alcohol Content

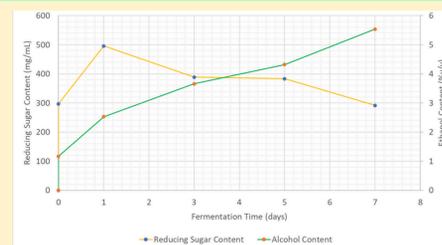


Figure 4: Comparisons between reducing sugar and alcohol content in cascara wine with brown sugar

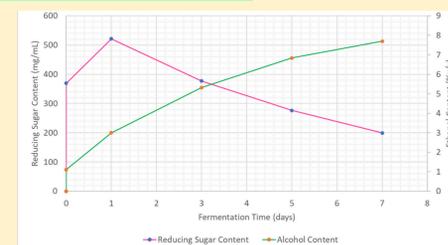


Figure 5: Comparisons between reducing sugar and alcohol content in cascara wine with palm sugar

Phenolic Compound Content

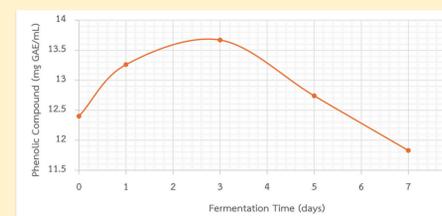


Figure 6: Phenolic compound content and fermentation time in cascara wine with brown sugar

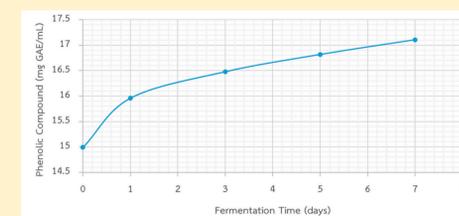


Figure 7: Phenolic compound content and fermentation time in cascara wine with palm sugar

Conclusion

Reducing Sugar

- Both types of cascara wine showed an increase in reducing sugar on day 1, followed by a decrease by day 7. However, the initial reducing sugar content in cascara wine with brown sugar was lower than in cascara wine with palm sugar.

Phenolic Compounds

- The cascara wine with brown sugar showed an initial increase in phenolic compounds, followed by a slight decrease by day 7, whereas the cascara wine with palm sugar continuously increased throughout fermentation.

Alcohol Content

- Alcohol content increased steadily in both cascara wines, with palm sugar reaching 7.70 (%v/v) by day 7, compared to 5.54 (%v/v) in the cascara wine with brown sugar.

Acknowledgement

- Asst. Prof. Dr. Jidapa Tinoi (Co-Project Advisor)
- Asst. Prof. Dr. Worraanong Leewattanapasuk (Seminar Committee)
- Dr. Pattanapong Thangsunan (Seminar Committee)
- Biofinery Research Laboratory members: Ms. Yaravee Najaras and Mr. Pornchai Junta
- Department of Chemistry, Faculty of Science, Chiang Mai University