PRODUCTION AND STUDY OF AMLA WINE

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ABSTRACT

Amla or Indian gooseberry (*Phyllanthus emblica* L.) is a native fruit of Thailand that has been promoted for community cultivation due to its high nutritional value, particularly its vitamin C content, polyphenols and antioxidant compounds. However, during periods of seasonal overproduction, it often encounters low market prices. Therefore, this study aimed to produce wine from amla and to investigate selected properties during the fermentation process as a guideline for adding value to this local fruit. Wine fermentation was conducted using 500 mL of amla juice and 10% (v/v) of a starter yeast culture, *Saccharomyces cerevisiae* EC-1118, at a temperature of approximately 25–30 °C for 7–14 days. Wine samples were collected at different fermentation times to analyze reducing sugar content, pH, alcohol content, vitamin C content, total polyphenol content, and antioxidant activity. The results showed that the reducing sugar content decreased by 84.5% at the end of fermentation, declining from 90.64 to 14.07 mg/mL after 13 days of fermentation. The vitamin C content decreased from 183 to 106 mg/100 mL on day 13 of fermentation. Meanwhile, the alcohol content increased in relation to the decrease in sugar content, reaching 8.27% at 13 days of fermentation. The pH of amla wine ranged from 3.17 to 3.23. The total polyphenol content decreased from 8.34 mg GAE/mL on day 0 to 4.60 mg GAE/mL on day 13 of fermentation, while the antioxidant activity (% inhibition) increased from 58.92 to 71.86 over the same period.

Keywords: Amla wine; Phyllanthus emblica; Fermentation; Polyphenols; Vitamin C; Antioxidant activity; *Saccharomyces cerevisiae*

INTRODUCTION

Amla (*Phyllanthus emblica* L.) is a fruit rich in nutritional and bioactive compounds, particularly vitamin C, phenolic compounds, and antioxidant activity. However, during peak harvesting periods, oversupply often leads to low market prices and post-harvest losses. Processing amla into value-added products such as wine can enhance its economic value and extend its shelf life.

Wine production involves alcoholic fermentation, where sugars in fruit juice are metabolized by yeast, mainly Saccharomyces cerevisiae. During this process, glucose is converted into ethanol and carbon dioxide through glycolysis and the alcoholic fermentation pathway, which influences the chemical properties of the final product.



Figure 1: Amla fruit (https://www.hfocus.org)



Figure 2: Amla juice (https://health.kapook.com)



Figure 3: Amla wine

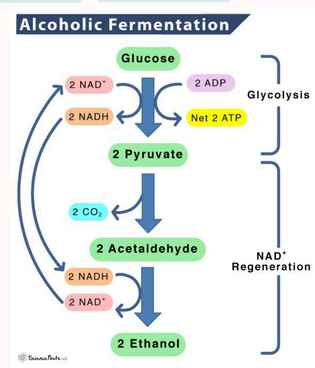
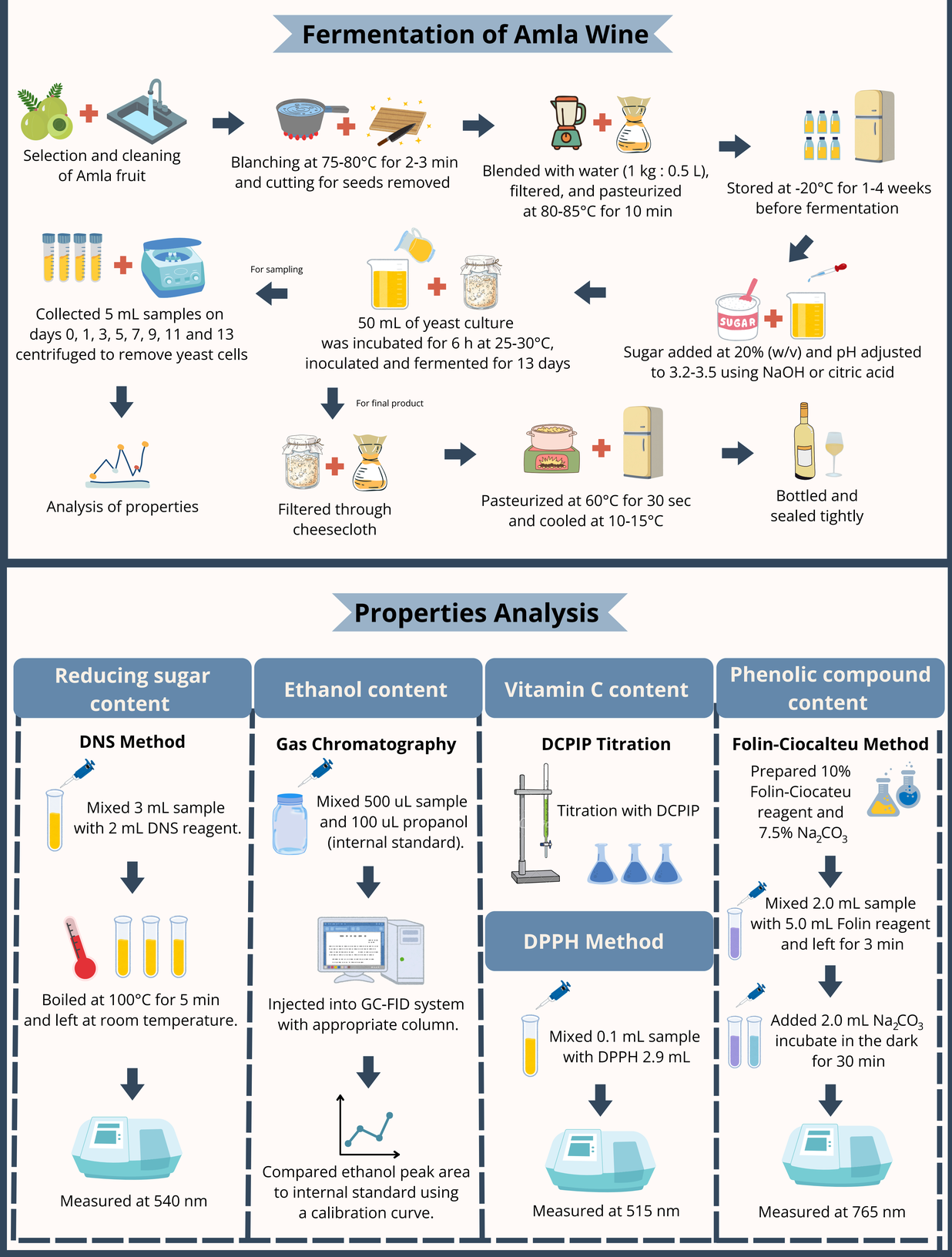


Figure 4: Alcoholic fermentation pathway (https://www.sciencefacts.net)

OBJECTIVES

- To produce amla wine through fermentation using *Saccharomyces cerevisiae*.
- To analyze the chemical and biological properties of amla wine.
- To evaluate the potential of amla for developing a fermented beverage that can add value to local fruit resources.

METHODOLOGY



RESULTS & DISCUSSION

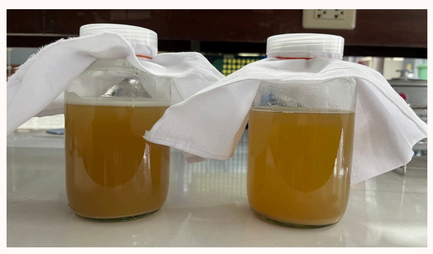


Figure 5: Fermentation of amla wine

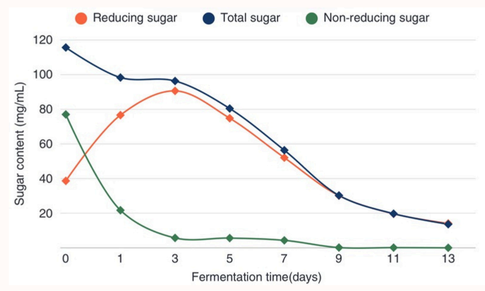


Figure 6: Sugar content of amla wine at various fermentation times

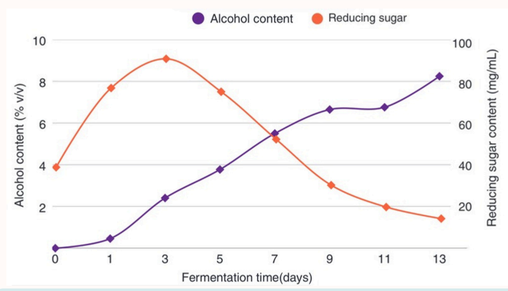


Figure 7: Comparison between reducing sugar and alcohol content of amla wine at various fermentation times

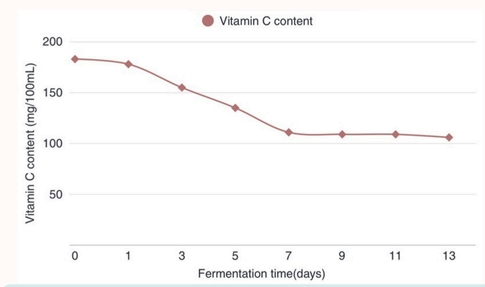


Figure 8: Vitamin C content of amla wine at various fermentation times

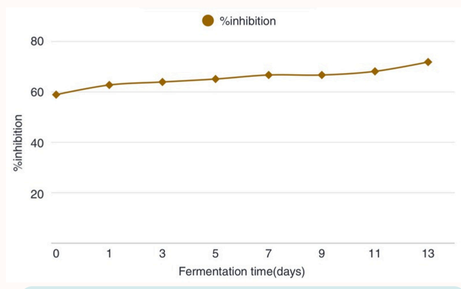


Figure 9: % inhibition of amla wine at various fermentation times

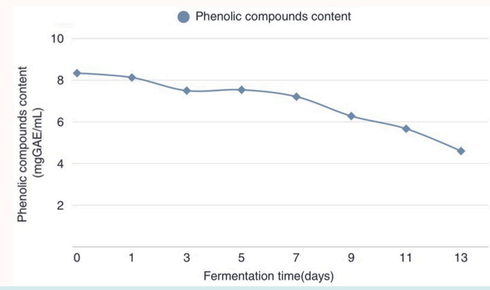


Figure 10: Phenolic compound content of amla wine at various fermentation times

CONCLUSION

Reducing Sugar: Reducing sugars decreased continuously during fermentation because yeast utilized glucose and fructose through glycolysis, converting them into ethanol, carbon dioxide, and other metabolites.

Alcohol content: Alcohol content increased over fermentation time due to the bioconversion of sugars into ethanol by yeast, corresponding with the reduction in sugar levels.

Vitamin C content: Vitamin C decreased during the early stage of fermentation due to its sensitivity to heat, oxygen, and acidic conditions, and possible oxidation to dehydroascorbic acid, then stabilized at later stages.

Phenolic compounds: Phenolic compounds decreased during fermentation, likely due to oxidation or degradation under acidic conditions.

Antioxidant activity: Antioxidant activity increased in the later stages of fermentation due to the accumulation of phenolic compounds and antioxidant metabolites, despite the reduction in vitamin C.

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