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BIOCHEMICAL CHANGES & QUALITY ASSESMENT DURING BANANA WINE FERMENTATION

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ABSTRACT

Banana wine is an alcoholic beverage prepared through the fermentation of banana juice using yeast. Bananas are rich in carbohydrates, vitamins, minerals, and natural sugars, making them suitable raw materials for wine production. The present study focuses on the preparation and fermentation of banana wine under controlled laboratory conditions. Fresh ripe bananas were processed to obtain juice, followed by the addition of sugar and yeast for fermentation. The fermentation process was carried out for several days at room temperature. Physicochemical parameters such as pH, alcohol content, titratable acidity, aroma, color, and taste were analyzed periodically. The results indicated successful fermentation with desirable sensory characteristics and acceptable alcohol production. Banana wine can be considered a nutritious and economically valuable fermented beverage with commercial potential.

KEYWORDS

Banana wine, Fermentation, Yeast, Alcohol production, Fruit wine, Physicochemical analysis.

INTRODUCTION

Banana wine is a fermented alcoholic beverage prepared from ripe banana juice through the action of yeast. Bananas are rich in natural sugars, potassium, vitamins, and antioxidants, making them an ideal substrate for fermentation. During fermentation, yeast converts sugars into alcohol and carbon dioxide under controlled conditions. The microorganism commonly used for wine fermentation is Saccharomyces cerevisiae,as reported by Kandhare et al. (2023) and Ezemba and Archibong (2022). Fruit wines have become increasingly popular because of their nutritional value, pleasant flavor, and low production cost, According to Dalal and Kumar (2023), fruit wines offer significant nutritional and commercial advantages. Banana wine possesses antioxidant properties and unique flavor compounds that contribute to its acceptability. Similar observations were reported by Li et al. (2022) during the development of green banana fruit wines. Banana wine possesses antioxidant properties and unique flavor compounds that contribute to its acceptability. The quality of wine depends on several factors such as banana variety, sugarconcentration, fermentation temperature, and yeast activity. Studies by Chang et al.

(2023) and Kurinian and Mastuti (2022) demonstrated that yeast concentration and fruit composition significantly influence wine quality. The present study was conducted to prepare banana wine and evaluate its biochemical changes and quality assurance during fermentation.

MATERIAL AND METHODS

Preparation of Banana Juice:

Figure 1:crushing banana.

Figure 2. Preparation of Banana must for fermentation

Fresh ripe bananas were washed thoroughly with distilled water to remove impurities. The bananas were peeled and cut into small pieces. The pulp was blended with distilled water and filtered using muslin cloth to obtain banana juice.

Preparation of Banana Must

The extracted banana juice was transferred into a sterilized fermentation flask. Sugar was added to increase the sugar concentration required for fermentation. The mixture was stirred properly to prepare the must.

Inoculation and Fermentation

Activated yeast culture was added to the prepared must. The fermentation flask was sealed with an air lock and kept at room temperature for 7–14 days for fermentation.

Monitoring of Biochemical Parameters

Samples were collected periodically during fermentation to analyze pH, total soluble solids, titratable acidity, and alcohol content.

RESULTS

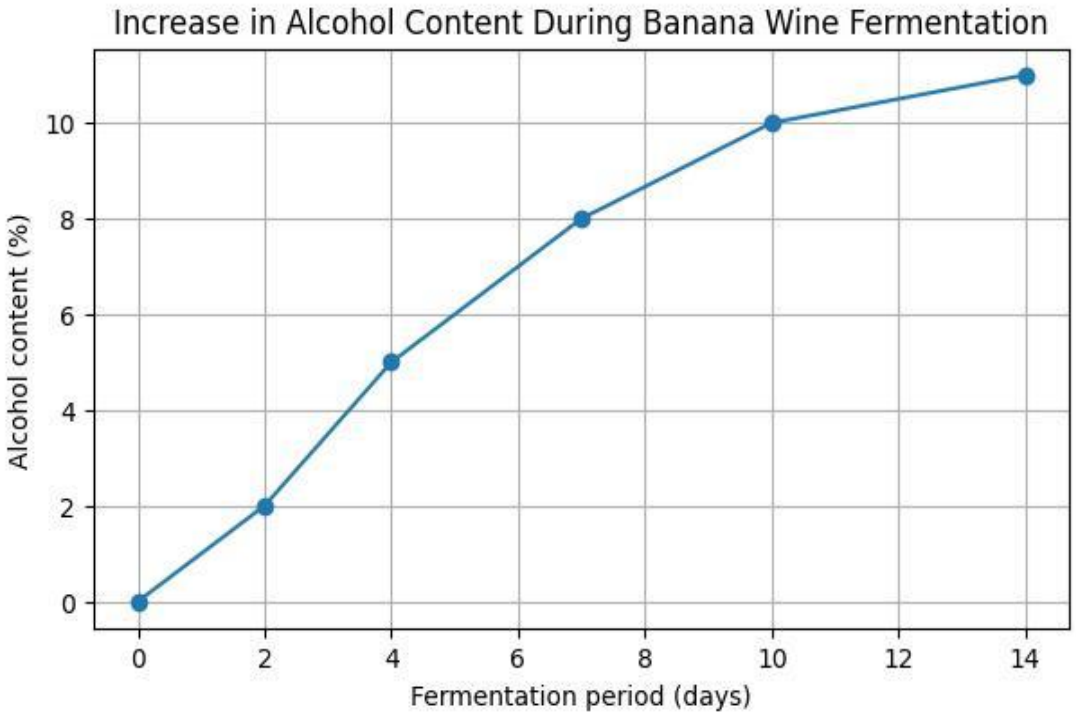

Figure 3 : Alcohol Percentage Of Wine

Table 1: Ingredients Used for Banana Wine Preparation

S.No	Ingredients	Quantity
1	Banana pulp/juice	1 L
2	Sugar	200 g
3	Yeast	5 g
4	Distilled water	100 ml

Table 2: Initial Composition of Banana Juice

Parameters	Initial value
pH	4.5
Total soluble solids	20
Titratable acidity	0.30

Table 3: Biochemical Changes During Fermentation

Fermentation Day	pH	Titratable Acidity (%)
0	4.5	0.30
3	4.1	0.42
7	3.8	0.58
10	3.5	0.70
14	3.3	0.80

DISCUSSION

The fermentation process showed significant biochemical changes in banana wine. The pH gradually decreased from 4.5 to 3.3 due to the production of organic acids during fermentation.Similar decreases in pH during banana wine fermentation were reported by Kandhare et al. (2023) and Alabere and Adebayo-Olajide (2023). Total soluble solids decreased continuously as sugars were utilized by yeastcells are fermented.Alcohol content increased progressively and reached approximately 10–12% by the 14th day of fermentation.Comparable alcohol production levels were observed by Ezemba and Archibong (2022) during banana wine production using *Saccharomyces cerevisiae*.Titratable acidity increased due to acid formation during the fermentation process. The final banana wine showed pleasant aroma, light golden color, and acceptable sensory characteristics, which agree with the findings of Chavan et al. (2022).

No microbial contamination was observed due to proper sterilization and hygienic handling practices during wine production.

The fermentation process resulted in a decrease in sugar concentration and an increase in alcohol content due to yeast activity.Similar biochemical trends were reported by Chang et al. (2023) in fruit wine fermentation studies.The reduction in pH and increase in titratable acidity improved the flavor and microbial stability of the banana wine. Proper quality assurance practices such as sterilization, hygienic handling, and monitoring of fermentation parameters helped maintain the quality of the product and prevented contamination. These observations are supported by the findings of Alabere and Adebayo-Olajide (2023). The final banana wine exhibited good sensory properties including acceptable taste, aroma, and clarity, which are consistent with the results reported by Li et al. (2022) and Kurinian and Mastuti (2022).

CONCLUSION

Banana wine production involves important biochemical changes including sugar reduction, alcohol formation, acid production, and pH reduction. These biochemical changes significantly affect the quality, flavor, and stability of the final product. Proper quality assurance measures such as hygienic handling, monitoring fermentation conditions, and microbial control ensure safe and high-quality banana wine production. The study confirms that banana wine can be successfully produced with good sensory quality and commercial potential through controlled fermentation practices.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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