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Study on Preparation and Analysis of Aloe Vera (Aloe Barbadensis) Wine

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Abstract
The demand for functional beverages has increased significantly, encouraging the use of alternative substrates such as aloe vera in fermentation processes. In the present study, aloe vera wine was prepared using *Saccharomyces cerevisiae* and evaluated for physicochemical, microbial, and sensory properties. The must was adjusted to 21°Brix and fermented for 10 days. Results showed alcohol content ranging from 1.22% to 2.50%, with a significant reduction in sugar levels. Statistical analysis using one-way ANOVA revealed significant differences ($p < 0.05$) among samples. The developed product exhibited antimicrobial activity and acceptable sensory attributes. The study confirms the potential of aloe vera as a substrate for value-added functional alcoholic beverages.

Keywords: Aloe vera wine, fermentation, *Saccharomyces cerevisiae*, ANOVA, functional beverage

1. Introduction

Wine production traditionally relies on fruit substrates; however, increasing interest in nutraceuticals has led to the exploration of plant-based alternatives such as aloe vera. Aloe vera (*Aloe barbadensis*) is rich in polysaccharides, antioxidants, and bioactive compounds, making it suitable for functional food applications (Eshun and He, 2004).

Fermentation enhances both shelf life and bioavailability of nutrients, while improving sensory quality (Jackson, 2014). The use of *Saccharomyces cerevisiae* is well established due to its high fermentation efficiency and alcohol tolerance (Sahu et al., 2013).

This study aims to develop aloe vera wine and evaluate its physicochemical, sensory, and statistical properties.

2. Materials and Methods

2.1 Raw Materials

Fresh aloe vera gel, sugar (21°Brix), yeast (*Saccharomyces cerevisiae*), and distilled water were used.

2.2 Preparation of Must and Fermentation

Aloe vera gel was extracted, filtered, and adjusted to 21°Brix. Fermentation was carried out for 10 days under controlled conditions using activated yeast culture.

2.3 Analytical Methods

Physicochemical parameters such as pH, titratable acidity, reducing sugars, and alcohol content were det-

ermined using standard AOAC methods (AOAC, 2016). Microbial and sensory analyses were also performed.

3. Results and Discussion

3.1 Physicochemical Properties

Table 1: Physicochemical Characteristics

Parameter	Sample A	Sample B	Sample C
pH	1.8	1.5	1.5
Acidity	0.536	0.67	0.804
Reducing Sugars (%)	32.41	28.69	28.26
Alcohol (%)	2.50	1.31	1.22

Fermentation significantly reduced sugar content while increasing alcohol production, confirming yeast activity (Jackson, 2014).

3.2 Graphical Representation

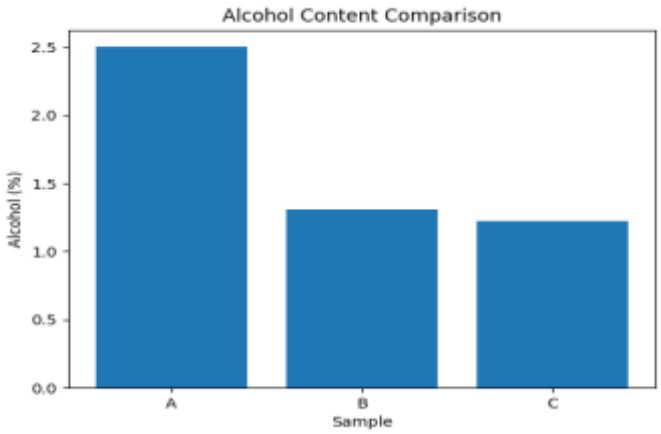

Figure 1: Alcohol Content of Aloe Vera Wine

- Bar graph representing alcohol percentage across samples
- Sample A shows highest alcohol production (2.50%)

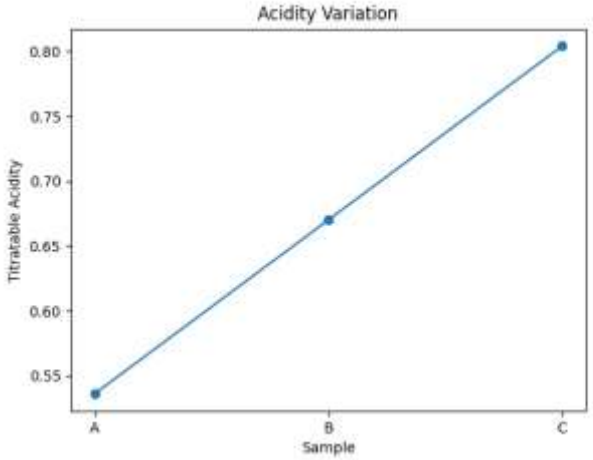

Figure 2: Titratable Acidity Variation

- Line graph showing increasing acidity from Sample A to C
- Indicates higher fermentation intensity

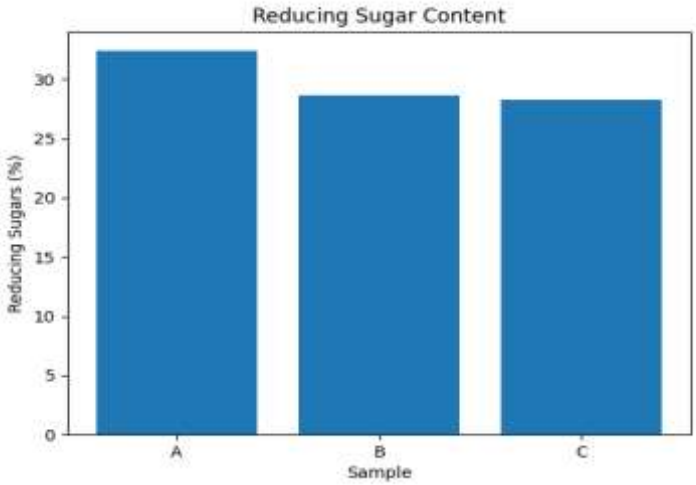

Figure 3: Reducing Sugar Content

- Bar graph showing decreasing sugar trend
- Confirms utilization of sugars during fermentation

3.3 Statistical Analysis

Table 2: ANOVA Results

Parameter	F-value	p-value
Alcohol	3828.250	0.000
Acidity	715.705	0.000
Sugars	2068.037	0.000

A one-way ANOVA indicated statistically significant differences ($p < 0.05$) among samples, confirming that fermentation conditions significantly influence physicochemical properties.

3.4 Sensory Evaluation

Sample	Appearance	Aroma	Taste	Overall
A	7.75	7.25	5.75	7.75
B	8.00	7.50	6.50	8.00
C	8.25	8.25	6.25	7.50

Sample B showed highest acceptability due to balanced sensory attributes.

3.5 Discussion

The reduction in sugars and increase in alcohol confirms effective fermentation. Higher acidity correlates with increased fermentation activity. However, aloe bitterness slightly affected taste, which aligns with previous findings (Sahu et al., 2013). Pasteurization ensured microbial safety.

4. Conclusion

Aloe vera wine was successfully developed with acceptable physicochemical and sensory properties. The

study highlights its potential as a functional beverage with antimicrobial properties.

5. References

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