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Exploring the efficacy of various preservatives methods in extending the shelf life of sugarcane juice

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Introduction

- **Nutritional Significance**: Sugarcane juice is a refreshing, nutrient-rich beverage with health benefits, including antioxidant properties and traditional medicinal uses.
- **Preservation Challenges**: Its high perishability, due to microbial contamination and enzymatic activity, limits shelf life to less than 24 hours.
- **Research Objective**: This study investigates microwave pasteurization and preservatives as innovative, cost-effective methods to enhance shelf life and ensure quality retention.

Material and Methods

- **Sample Preparation:** Juice was extracted from cleaned, mature sugarcane, filtered through muslin cloth, and acidified with lemon juice.
- **Treatments:** Five treatments (T_1-T_5) included microwave pasteurization (80°C, 90°C) and preservatives (sodium benzoate and citric acid), individually or combined, alongside an untreated control (T_0).
- **Storage and Analysis:** Juice was bottled, refrigerated (5±1°C), and analyzed over 40 days for physicochemical, microbial, and sensory attributes.

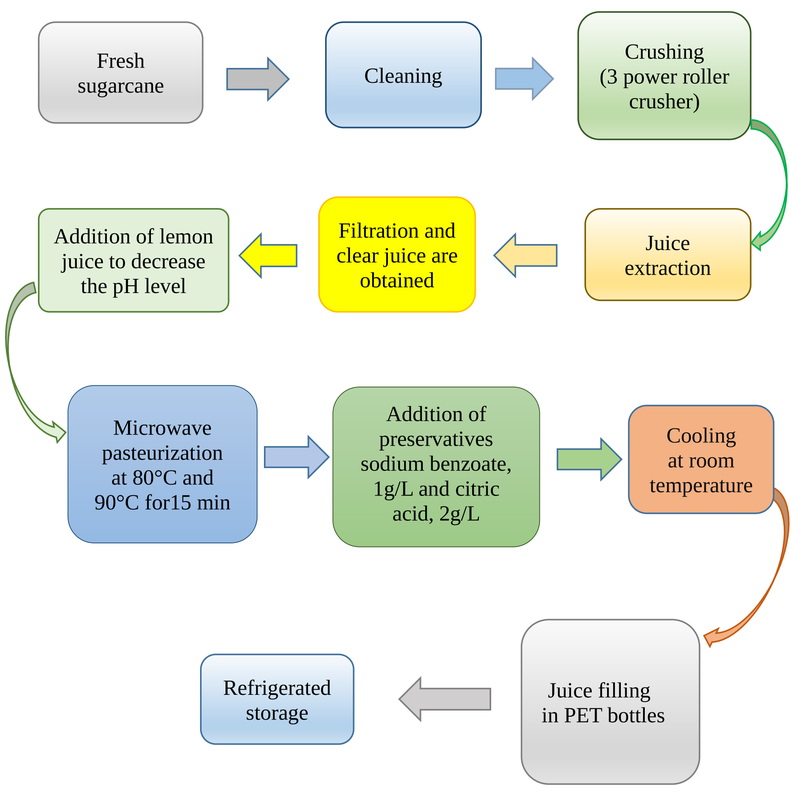

Fig. 1 *Flow chart for the experimental layout*

Results

- **Best Treatment**: T_5 (microwave at 90°C + preservatives) emerged as the most effective, preserving color, titratable acidity, and phenolic content while minimizing microbial growth.
- **Sensory Excellence**: T_4 and T_5 received the highest scores for overall acceptability, based on visual appearance, flavor, taste, ensuring superior quality and extended shelf life.

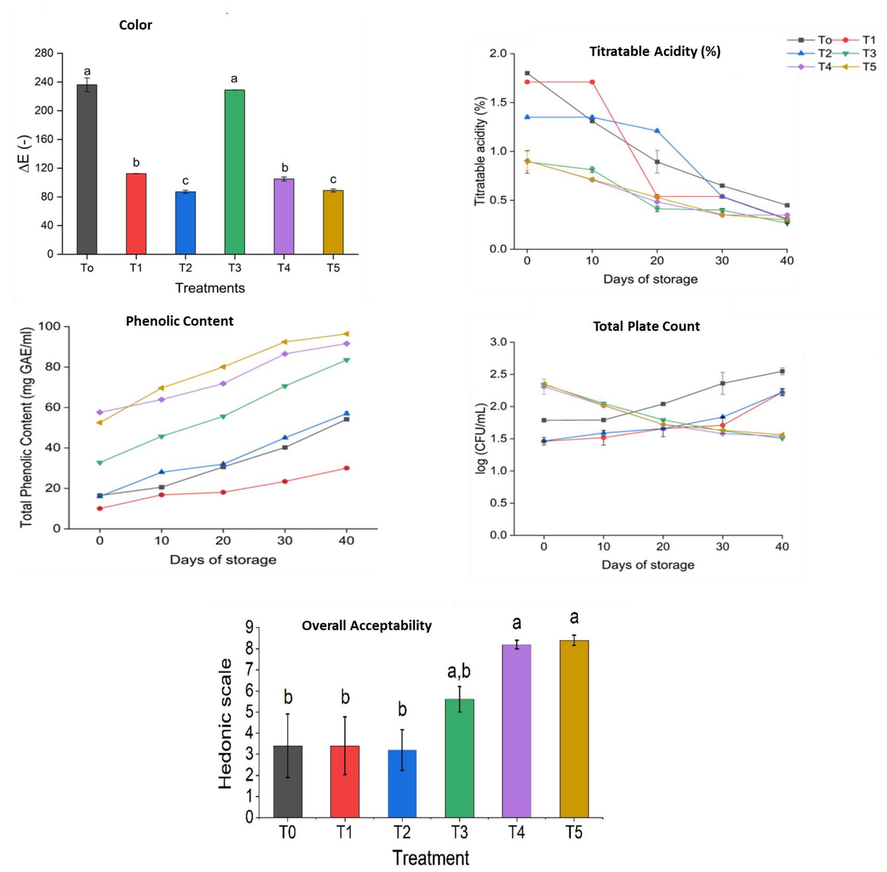

Fig. 2 *Changes in color, titratable acidity, phenolic content, microbial count and overall acceptability of sugarcane juice under treatments (T_o-T_5) were observed during storage for 40 days. T_o represents untreated juice, while T_1 and T_2 denote juice pasteurized using microwaves at 80°C and 90°C, respectively. T_3 indicates juice treated with sodium benzoate and citric acid at a ratio of 1:2 g/L. T_4 and T_5 represent juice subjected to combined treatment: microwaving at 80°C and 90°C along with sodium benzoate and citric acid at a ratio of 1:2 g/L. Different letters on the bar graphs indicate significant differences at $p < 0.05$.*

Conclusions

- Microwave pasteurization at 90°C, especially combined with preservatives (T_5), effectively preserved sugarcane juice's quality, stability, and sensory acceptability over 40 days.
- These findings offer a practical approach for extending shelf life while maintaining nutritional value and consumer appeal.

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