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Extending The Shelf Life Of Tiger-Nut Milk Drinks

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Abstract

Tiger-nut milk is a potential alternative to traditional milk due to its nutritional value and affordability. However, its short shelf life limits its utilization. This study investigates the effects of two natural preservatives, Amaranthus caudatus and Syzygium aromaticum, on the shelf life of tiger-nut milk drinks.

Keywords: Tiger nut, Milk, Processing. Spoilage, and shelf-life.

Introduction

Tiger-nut (Cyperus esculentus) is a perennial plant with edible tubers. Its milk is a promising alternative to traditional milk, offering a potential solution to protein malnutrition. This study aims to:

1. Analyze the microbial composition of tiger-nut milk drink stored at different temperatures.
2. Determine the storage stability of tiger-nut milk drinks at various temperatures.

Key Points

- Tiger-nut milk is a nutritious and affordable alternative to traditional milk.
- Natural preservatives like Amaranthus caudatus and Syzygium aromaticum can extend its shelf life.
- Microbial analysis and storage stability are crucial for ensuring the quality and safety of tiger-nut milk drinks.

Tiger-Nut Milk Drink Processing and Preservation

Introduction

Tiger-nut milk is a nutritious and refreshing drink with potential health benefits. However, its short shelf life limits its utilization. This study investigates the effects of natural preservatives, Amaranthus caudatus and Syzygium aromaticum, on the shelf life of tiger-nut milk drinks.

Materials and Methods

Materials

- Tiger-nuts
- Amaranthus caudatus
- Syzygium aromaticum
- Chemical preservatives (sodium benzoate)

Preparation of Tiger-Nut Milk Drinks

1. Soaking: Tiger-nut seeds are soaked in clean water to soften and remove antioxidants.
2. Milling: Soaked tiger-nuts are milled and pressed to extract milk.
3. Preservative addition: Natural preservatives (Amaranthus caudatus and Syzygium aromaticum) are added to the milk.

Experimental Design

The study consists of four samples:

1. Tiger-nut milk alone (control)
2. Tiger-nut milk with clove (Syzygium aromaticum)
3. Tiger-nut milk with African spinach (Amaranthus caudatus)
4. Tiger-nut milk with both clove and African spinach

Samples are stored at different temperatures (ambient, refrigerated, and accelerated) and analyzed for microbial growth and shelf life.

Storage Stability and Microbial Quality of Tiger-Nut Milk Drink

Storage Stability

The study investigated the effects of storage time on crude protein composition and pH of tiger-nut milk drink at different temperatures. Results showed:

- Crude protein increased with storage time across all temperatures.
- pH decreased and tended towards acidic pH with increasing storage time.

Microbial Quality

The study isolated various bacterial species from tiger-nut milk drink with and without preservatives. Results showed:

- Tiger-nut milk without preservatives had a diverse range of bacterial species, including Bacillus pumilus, Staphylococcus xylosus, and Lactobacillus spp.
- Preservatives, such as Amaranthus caudatus and Syzygium aromaticum, inhibited microbial growth and reduced bacterial diversity.

Natural Preservatives

The study highlighted the potential of two natural preservatives:

- Amaranthus caudatus (African spinach) has antimicrobial properties and can be used as a lactogogue and emollient.
- Syzygium aromaticum (clove) has antioxidant and antimicrobial activities, and can inhibit microbial growth.

Microbial Composition of Tiger-Nut Drink

Results

The study investigated the microbial composition of tiger-nut milk drink samples stored at different temperatures (refrigerated, ambient, and elevated) with various preservatives. Results showed:

- Microbial load (total bacterial count, total coliform count, and total fungal count) increased with storage time, peaking on day 21 for all samples.
- Preservatives, such as Syzygium aromaticum (cloves) and Amaranthus caudatus, reduced microbial growth and diversity.
- Tiger-nut drink without preservatives exhibited greater bacterial diversity compared to those with preservatives.

Discussion

The study highlights the importance of preservatives in controlling microbial growth and extending the shelf life of tiger-nut milk drinks. The results suggest that:

- Refrigeration slows down microbial proliferation, but microbial growth still occurs over time.
- Ambient and elevated temperatures accelerate microbial spoilage, making refrigeration or preservatives necessary for shelf-life extension.
- Syzygium aromaticum (cloves) and Amaranthus caudatus have potential as natural preservatives for tiger-nut milk drinks.

Conclusion

The study demonstrates the effectiveness of preservatives in controlling microbial growth and maintaining sensory quality of tiger-nut milk drinks. The results have implications for the production and storage of tiger-nut milk drinks, highlighting the importance of proper storage conditions and preservative use.

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