

Optimization of Deep-Frying Methods to Enhance the Shelf Life and Quality of Sardines in Lake Victoria, Tanzania

Introduction

Background

Sardines (*Rastrineobola argentea*) from Lake Victoria are an important source of protein, omega-3 fatty acids, and essential micronutrients, accounting for approximately 60% of the region's total fish catch. Deep-frying, primarily carried out by women on a small scale, adds value to the product and supports the livelihoods of local communities.

Problem statement and Justification

Fried sardines are packaged in various materials and sizes, then sold in supermarkets and other markets. The trade requires adherence to product standards for local and regional markets. While much attention has focused on fish quality, safety, and processing, standardized protocols and shelf-life data for deep-fried sardines are still lacking. This study aims to address the shelf-life of deep-fried sardines, enhance product safety and quality to meet market standards, inform fisheries policy on value addition and marketing, and empower women fish processors to access premium markets.

Objectives

1. To evaluate the current deep-frying practices employed by sardine processors in the Lake Victoria, Mwanza region.
2. To identify the best deep-frying method for achieving high-quality sardines and assess their shelf-life through sensory and chemical analysis, including water activity and secondary lipid oxidation (thiobarbituric acid reactive substances, TBARS).

Methodology

1. Semi-structured questionnaire used for objective 1 in Lake Victoria, Tanzania.
2. Experiment conducted for objective 2 on shelf life by using capelin due to unavailability of sardine in Iceland.

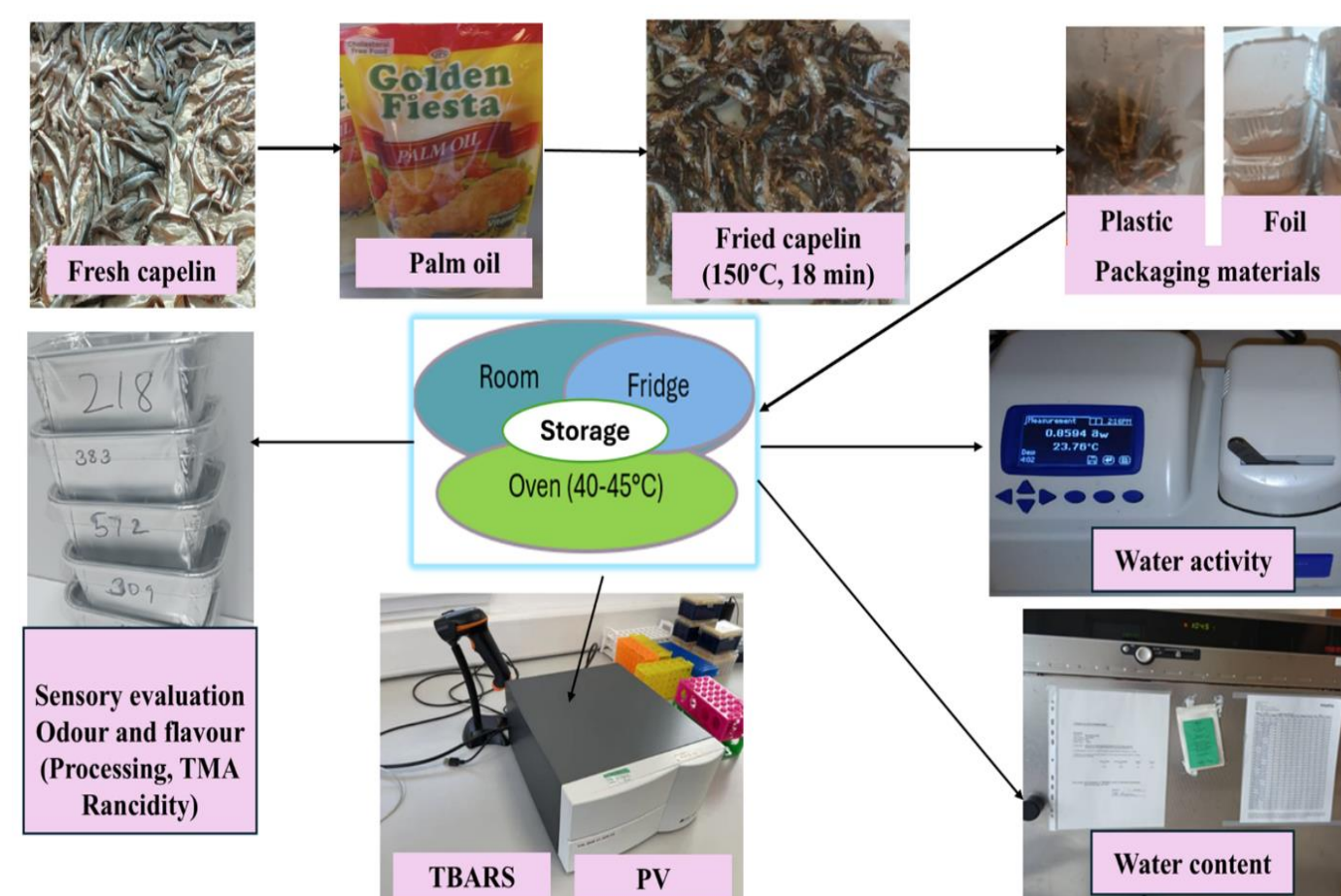


Fig 1. Experimental design

Results

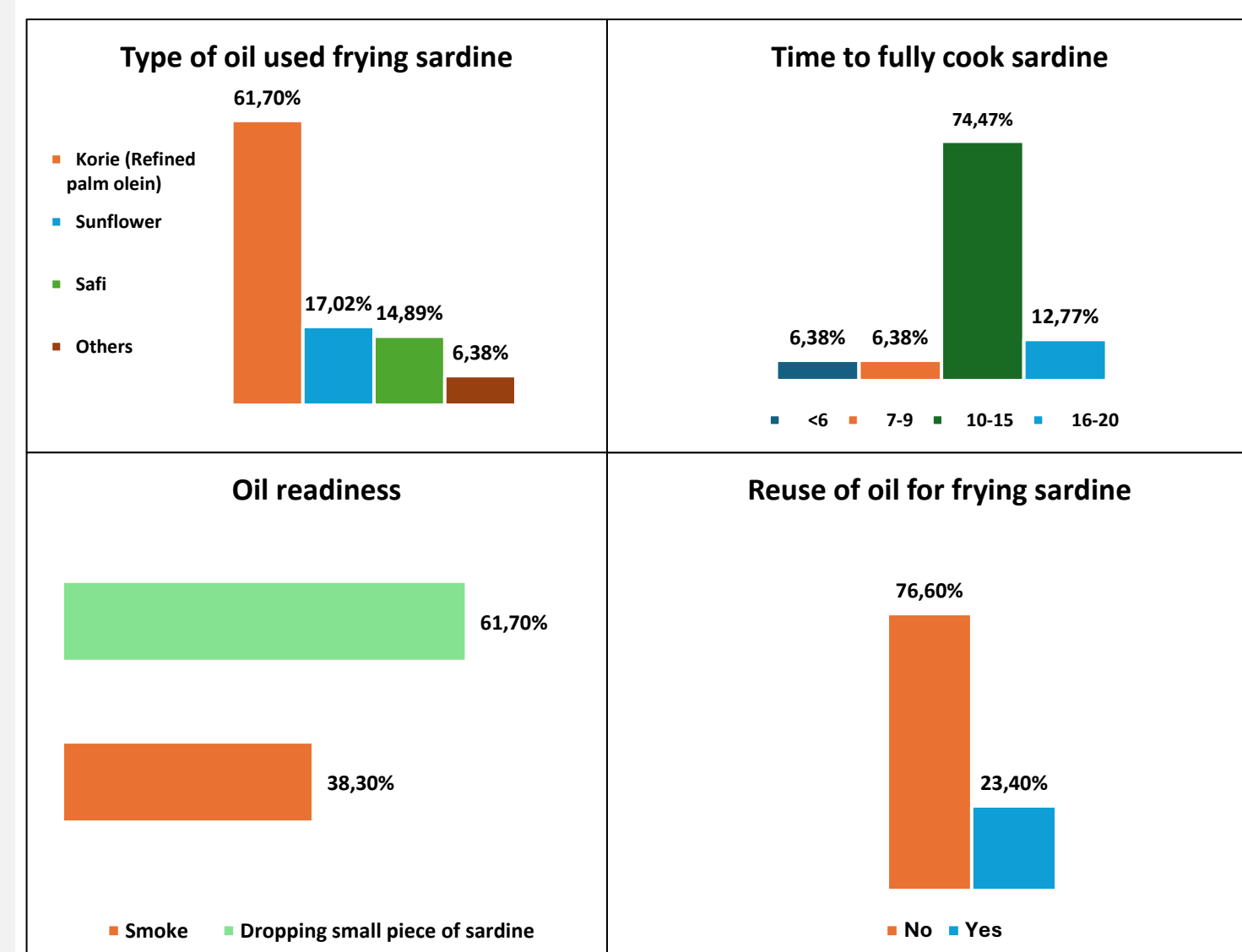


Fig 2. Current deep-frying practices of sardine in Lake Victoria

Results (cont.)

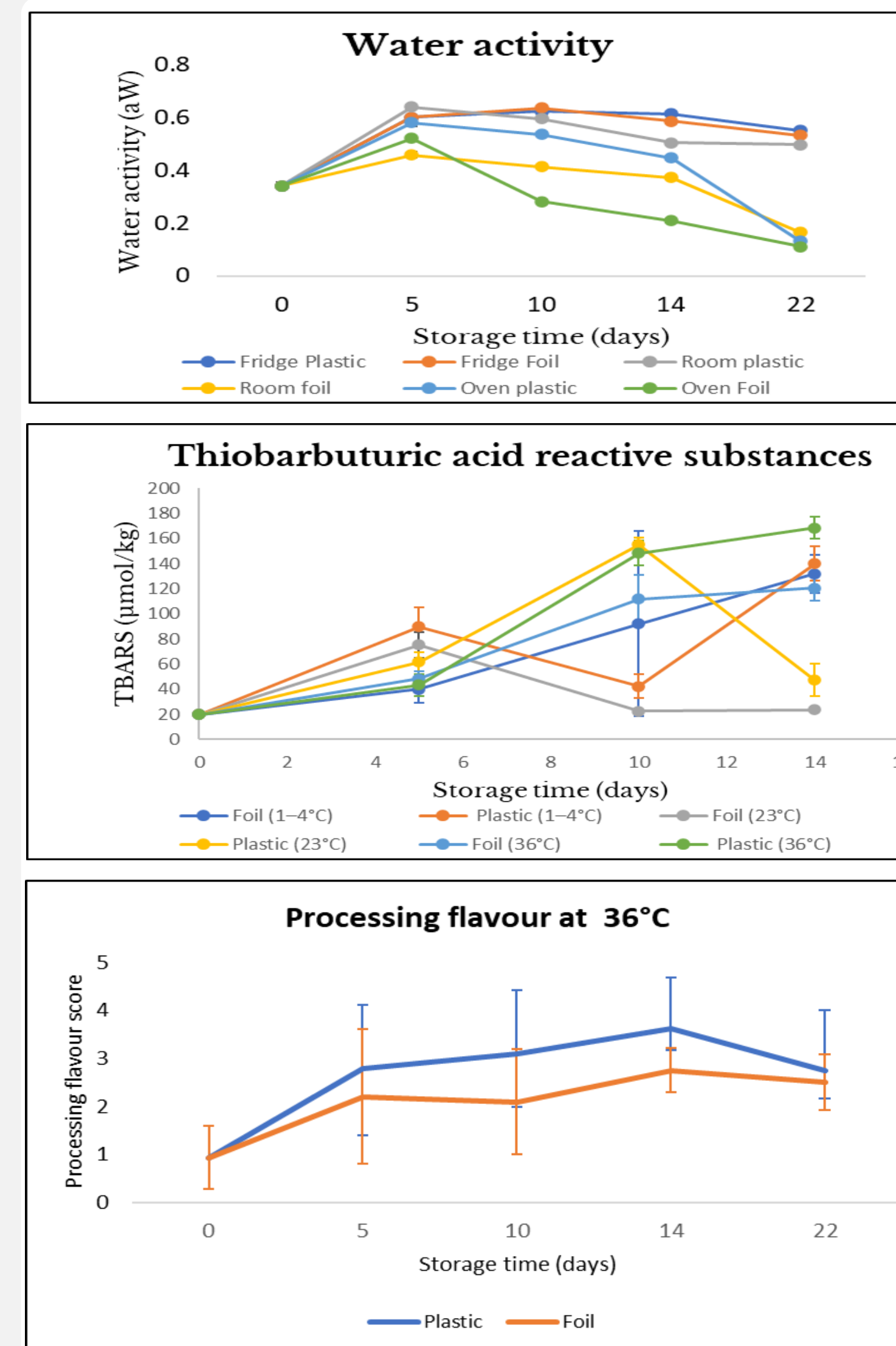


Fig 3. Shelf-life analysis of capelin on chemical and sensory

- The results indicate that plastic packaging bags at a high temperature of 36°C led to higher water activity, secondary lipid oxidation, and processing flavour changes compared to foil packaging over the storage period.
- Additionally, storage time had a significant impact on shelf life.

Conclusion

- Sardine processors in Mwanza prefer refined palm oil (Korie oil) for frying, plastic bag packaging, and storing products at room temperature.
- Deep-fried capelin, stored in plastic and foil for 22 days, remained acceptable for human consumption.
- Storing the samples at 36°C led to excessive drying, regardless of packaging. However, when stored at room temperature, foil packaging was the most effective, as it kept the samples adequately dried, and due to low water activity, resulted in less fishy flavour.
- Protocols for deep frying and shelf-life assessment of sardines were developed from this study.

Recommendations

- Include sensory evaluations of texture and fishy flavor to gain better insight into consumer preferences.
- Increase the number of sensory panelists.
- Extend the duration of shelf-life experiment.
- Train processors in quality control, hygiene, and best practices.
- Include microbiological analysis during the shelf-life analysis to ensure safety and compliance.

Acknowledgements