Determination of Shelf-Life of Smoked Fish using Vinegar and Lemon Juice as Preservatives

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Introduction

The enzymatic and microbiological processes that begin as soon as fish and other seafood are captured make them especially susceptible to degradation. It is prominent that fish products possess high concentration of omega-3 polyunsaturated fatty acids, which makes them susceptible to peroxidation during storage, which could change the fish's nutritional value and sensory appeal (Omage, 2015). Fish smoking is a common processing method that aims to prevent or reduce postharvest losses. The longevity of fish after smoking is influenced by a number of factors. Due to their natural antibacterial and antioxidant properties, plants may be studied for use as preservatives in a range of applications (Omage, 2015). Therefore, this study is aimed to determine the shelf life of smoked fish using vinegar and lemon juice as preservatives.

Materials and method

Fish, salt, lemon, and vinegar were procured from a local market in Ilaro, Ogun State, and transported to The Federal Polytechnic, Ilaro Microbiology Laboratory for further analysis. The fish was smoked locally and were divided into ten (10) treatments: Sample A: Control (No preservative), Sample B: Salt, Sample C: Smoked fish + Lemon (15 mL), Sample D: Smoked fish + Lemon (20 mL), Sample E: Smoked fish + Vinegar (10 mL), Sample F: Smoked fish + Vinegar (15 mL), Sample G: Smoked fish + Vinegar (20 mL), Sample H: Smoked fish + Lemon and Vinegar (10 mL), Sample I: Smoked fish + Lemon and Vinegar (15 mL), Sample J: Smoked fish + Lemon and Vinegar (20 mL).
The treatments were kept for 4 days and were subjected to analysis.

Results and discussion

Ash content of the treated samples ranged from 0.20% to 0.40%, as shown in Table 1. The microbial analysis in Table 2 revealed significant variations in microbial load across treatments. The control sample had high total aerobic microbial viable counts (350cfu/g) and substantial yeast, mould, and pathogenic bacteria. Salt-treated samples showed an increase in microbial load (230cfu/g), while lemon (15 ml) and vinegar (10 ml) were more effective, reducing microbial counts to 150cfu/g and 100cfu/g, respectively, and eliminating key pathogens like *Salmonella* spp and *Shigella* spp. However, vinegar at 20 ml resulted in a paradoxical increase in microbial counts (320cfu/g), likely due to microbial adaptation. A combination of lemon and vinegar (15 ml and 20 ml) effectively reduced microbial load and eliminated pathogens.

Conclusion

Vinegar and lemon juice proved to be effective natural preservatives in extending the shelf life of smoked fish by reducing microbial loads. Therefore, optimizing the concentration of these preservatives is crucial for achieving optimal shelf-life extension.

Reference

Omage, I. B. (2015). Antimicrobial activity of some medicinal plant extracts in vitro against fish pathogens. B.Sc project report, Ondo State University of Science and Technology, Okitipupa. xviii-87pp