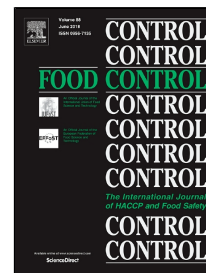


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FUNGAL AND MYCOTOXIN CONTAMINATION OF FERMENTED FOODS FROM SELECTED SOUTH AFRICAN MARKETS

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Abstract

In this study, five regularly consumed fermented foods: fermented melon (*ogiri*), locust beans (*iru*), African oil bean (*ugba*), maize meal (*mahewu*) and maize gruel (*ogi*) purchased from South African markets were evaluated for fungal diversity using 16S rRNA gene sequencing and mycotoxin contamination using liquid chromatography tandem mass spectrometry, respectively. In addition, their pH, moisture content, Total Titratable Acidity (TTA) and water activity were accessed. The investigation revealed a mean pH range of 3.60 to 8.14 within the samples and a significant but negative correlation between the pH and TTA ($r = -0.560$, $p < 0.05$). *Ogiri* samples had the highest mean fungal load (8.30×10^5 CFU/g) and 340 fungal isolates belonging to 17 genera were recovered from all the foods analysed. The dominant fungal genera were *Aspergillus* and *Saccharomyces*. A total of 23 mycotoxins were quantified, aflatoxin B₁ was present in 50% of the *ogiri* samples analysed with a mean value of 4 µg/kg, whereas fumonisin B₁ was detected in 37% of *ogi* (range: 42-326 µg/kg) and 73% of *mahewu* samples had deoxynivalenol (range: 18-32 µg/L). Overall, 66% of the samples (n=176) had mycotoxins occurring singly or in combination which could pose some synergistic, additive, or antagonistic health effects amongst consumers.

Keywords: Fermented foods, fungi, mycotoxins, food safety, water activity, South Africa

1.0 Introduction

In several developing countries including South Africa, fermented foods constitute a major part of the people's diet, and have significantly contributed to the socio-economic wellbeing of individuals (Oguntoyinbo, 2014). The socio-economic role of fermented foods includes employment creation particularly for women and provision of affordable varieties of food. Coupled with an increasing population, their demand has increased both at home and in the diaspora. However, expatriate Nigerians represent the main consumers in the emerging South African markets for authentic ethnic fermented foods such as maize gruel (*ogi*), African oil bean (*ugba*), locust beans (*iru*) and melon (*ogiri*), which are usually imported into South Africa from Nigeria. An estimate of \$ 1.1 million was accrued to agricultural imports from Nigeria to South Africa accounting for 12% import from the region (Daya & Steenkamp, 2005). *Ogi* is produced from maize through lactic acid fermentation, consumed mainly as breakfast and used as weaning food for infants (Omemu, Oyewole & Bankole, 2007). *Ugba* and *ogiri* are derived from oil seeds (African oil bean seed and melon, respectively), in

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