Low molecular weight peptides generated from palm kernel cake via solid state lactofermentation extend the shelf life of bread

ABSTRACT

This study aimed at investigating the potential antifungal activity of low molecular weight peptides being a natural preservative generated from palm kernel cake (PKC) via solid state lacto-fermentation. Palm kernel cake was hydrolysed by L. casei generating a peptide mixture with a DH of 43.39% under predetermined optimum conditions of 5.6 days incubation, 3% glucose, and substrate/water ratio of 48/52 w/v. A total of 10 cationic peptides with molecular weight ranging from 932 to 1869 Da were identified by LC/MS-MS, in which 7 belonged to oil palm proteins and 3 de novo peptides biosynthesized by the microorganism during the fermentation process. The aqueous extract of the peptides mixture demonstrated strong antifungal activity against Aspergillus flavus (69.15%), Aspergillus niger (88.08%), Fusarium sp. (87.14%), and Penicillium sp. (71.84%). 1H-NMR spectroscopy results showed the presence of trace amounts of lactic and acetic acid, indicating that the antimicrobial activity was solely attributed by the low molecular weight peptides. The peptides mixture successfully delayed fungal growth, thus extending the shelf life of bread for up to 10 days when added to the bread at 2000 mg/kg. These findings indicated a promising application of the peptides mixture as a bio-preservative in extending the shelf life of bread.

Keyword: Peptides; Food preservatives; Sustainable; PKC; Fungi