

4th World Congress and Expo on

Applied Microbiology

September 19-21, 2016 Las Vegas, USA

The effects of protective agents and rehydration media on survival of freeze-dried *Candida xestobii* and *Bacillus mycoides* strains for the formulation of biocontrol agent

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The aim of this study was to evaluate the effect of addition of freeze-drying protective substances (Sucrose 10%, glucose 10%, fructose 10%, lactose 10%, skimmed milk 10%) or their combinations (Sucrose 10%+Skimmed milk 10%, glucose 10%+Skimmed milk 10%, fructose 10%+Skimmed milk 10%, lactose 10%+Skimmed milk) and different rehydration media (water, 10% NFSM, phosphate buffer) on the viability and storage stability of *Bacillus cereus* and *Candida xestobii* freeze-dried cells for biocontrol of green-mold disease of stored *Sorghum* grains caused by *Aspergillus flavus*. *Candida xestobii* and *Bacillus mycoides* strains were previously isolated from non-diseased stored *Sorghum* grains. Several concentrations of protective agents and rehydration media were added separately during freeze-drying to determine tolerance and survival rate of *Candida xestobii* and *Bacillus mycoides* strains after freeze-drying. The survival rate after rehydration and during storage of freeze-dried strains was evaluated. The results indicated significant decrease in viability of *Candida xestobii* and *Bacillus mycoides* freeze-dried cells. Addition of Sucrose 10%+Skimmed milk 10% and sucrose 10% as freeze-drying protectants significantly increased the survival rate of *Candida xestobii* and *Bacillus mycoides* ($p < 0.05$) and rehydration with water provided a better recovery of freeze-dried *Candida xestobii* than *Bacillus mycoides* cells. Rehydration with Skimmed milk 10% conferred higher cell viability for *Bacillus mycoides*. In subsequent storage, *B. mycoides* and *Candida xestobii* cells shelf life was maintained during 30 days when stored at 4 °C (96-86%) and decreased significantly from 96-24% at 22±1 °C over a period of 120 days. This study has shown that shock tolerance, survival and cell stability of *B. mycoides* and *C. xestobii* strains could be improved during freeze-drying by use of freeze-drying protectants, rehydration media and storage temperature during formulation process of these antagonistic strains for eventual post-harvest application.

Biography

Rex Ogbonnaya Ogbonnaya has obtained his PhD in Industrial Microbiology & Biotechnology in 2014 from Michael Okpara University of Agriculture, Nigeria and has since then working as a Lecturer at the Department of Biolog, Microbiology, Biotechnology at the Federal University Ndufu Alike-Ikwo, Ebonyi state, Nigeria. He was the Director of Quality Assurance & Control in Petsow Laboratories Limited (former Petsow Integra), a fore-front Pharmaceutical Industry in Nigeria and subsidiary of Starline Conglomerate for several years. He has published a number of papers in reputed journals.

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