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Probiotic and Technological Properties of Exopolysaccharide Producing Lactic Acid Bacteria Isolated from Cereal-based Nigerian Fermented Food Products

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1 Probiotic and Technological Properties of Exopolysaccharide Producing Lactic Acid 2 Bacteria Isolated from Cereal-based Nigerian Fermented Food Products

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8 Abstract

9 The present study aims to evaluate the probiotic potential and technological properties of
10 exopolysaccharide (EPS) producing lactic acid bacteria (LAB) isolated from Nigerian fermented
11 cereal-based foods. Sixty-three autochthonous LAB isolated from cereal-based fermented foods
12 were screened for EPS production, five isolates produced an appreciable amount of EPS on
13 sucrose modified media and were identified by sequencing the 16S rRNA gene as *L.plantarum*
14 YO175, *L.plantarum* OF101, *P. pentosaceus* OF31, *W. confusa* OF126 and *W. confusa* WS90.
15 These five isolates were assessed for their probiotic and technological properties viz., tolerance
16 to low pH, bile salt resistance, bile salt hydrolysis, tolerance to simulated gastric transit, cell
17 surface hydrophobicity, antimicrobial, amylolytic and acidifying activity. The LAB isolates
18 showed good survival at pH 2.0 and 2.5 and were resistant to 0.3 % bile salt after 4 h. All the
19 isolates tolerate gastric juice condition, with no reduction in viability except *W. confusa* WS90
20 that lost viability over 180 min incubation time. *L. plantarum* OF101 showed the highest
21 hydrophobicity values for n-hexadecane and xylene (43.6 %, 46.2%). They all showed different
22 antimicrobial activities against five food-borne pathogens. *P. pentosaceus* OF31 possessed the
23 highest ability to inhibit pathogens and also demonstrated better and rapid acid production
24 capability. Albeit the properties tested are strain-dependent, *L. plantarum* and *P. pentosaceus*
25 strains were found to possess interesting functional and probiotic characteristics to a greater
26 extent compared to *W. cibaria* strains. The safety investigations indicate their suitability as good
27 candidates for cereal-based probiotic products/starter culture for the improvement of traditional
28 cereal fermentation process and also the development of functional cereal foods.

29
30 **Keywords:** Lactic acid bacteria; Exopolysaccharide; Cereal-based foods; Probiotic; Starter
31 culture
32

33 1. Introduction

34 Cereals are edible grains which form part of the human diet since ancient times, they remained
35 important food crop with an estimated global production of 2500 million tonnes in 2015 (FAO,
36 2016). They serve as an important source of energy, carbohydrate, protein and fiber,
37 micronutrients (vitamin E, vitamin B), sodium, magnesium, and zinc (Waters, Mauch, Coffey,
38 Arendt, & Zannini, 2015). Cereals are staple food crops as they often make up the bulk of the

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