



VII Congreso Internacional CIENCIA Y TECNOLOGÍA de los **ALIMENTOS 2018**

LIBRO DE RESUMENES



DEL 1 AL 3 DE OCTUBRE | Córdoba - Argentina.



VII Congreso Internacional Ciencia y Tecnología de los Alimentos 2018 : libro de resúmenes / Laura Aballay ... [et al.] ; compilado por Ezequiel Veneciano ; editado por Alberto Edel León ; Victoria Rosati. - 1a edición especial - Córdoba : Ministerio de Ciencia y Tecnología de la provincia de Córdoba, 2018.

Libro digital, PDF

Archivo Digital: descarga y online

Edición para Córdoba (prov.). Ministerio de Ciencia y Tecnología de la provincia de Córdoba

ISBN 978-987-45380-9-3

1. Alimentos. 2. Ciencia y Tecnología. I. Aballay, Laura II. Veneciano, Ezequiel, comp. III. León, Alberto Edel , ed. IV. Rosati, Victoria , ed.

CDD 664

ISBN 978-987-45380-9-3





Chia and Flaxseed flours fermented by Lactic acid Bacteria for the production of gluten free baked products

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Chia and flaxseed flours are widely consumed due to their health and nutritional benefits as high proteins and omega-3 content and gluten free properties. Fermentation of these high-protein flours (sourdoughs) is characterized by a complex microbial ecosystem, mainly represented by lactic acid bacteria (LAB) and yeasts, the resulting products exhibiting high palatability and sensory quality. Selected LAB (*Weissella (W.) cibaria* C-2, *Lactobacillus (Lb.) plantarum* FUA3161 and *Lb. fermentum* FUA3171) were used as functional cultures. Microbiological and technological features (peroxidase and proteolytic activities, water-soluble polysaccharides hydrolysis and organic acids production) of the strains in flour slurries were evaluated and sensory analysis of final fermented products (by an untrained panel) were carried out. *W. cibaria* C-2 was able to produce higher hydrogen peroxide concentration during sourdough fermentation than those obtained with *Lb. plantarum* FUA3161 or *Lb. fermentum* FUA3171. Among analyzed strains, moderate protein degradation and soluble polysaccharides hydrolysis were produced by *W. cibaria* C-2 showing accumulation of xylose > arabinose >> rhamnose and organic acids production (lactate >> ethanol > acetate). Then, LAB strains (10^7 UFC/g) were used as inoculum (individually and in combination) for sourdoughs production (chia and flaxseed). To obtain a baked product, different proportions (5, 10, 20, 30 y 40 %) of the pre-ferment was added to a mixture (sorghum flour, xanthan gum, sucrose, NaCl and yeast), incubated at 30 °C for 90 min and cooked in an oven at 350 °C, 35 min. Low percentages of pre-ferments had higher incidence in products specific volume. When sensory evaluation was performed, it was able to distinguish (> 50% of panelists) baked products inoculated with *W. cibaria* C-2 as those with higher taste, texture and overall aspect. The data show the great potential of LAB as alternative for improving sourdough (chia and flaxseed) fermentation.

Keywords: Lactic acid bacteria, fermentation, chia, flaxseed, sourdoughs.