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Probiotic bacteria in flax seed beverages

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Instituto Politécnico de Castelo Branco
Escola Superior Agrária

Training Report

Probiotic Bacteria in Flax Seed Beverages

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Engenharia Biológica e Alimentar

Supervisor at ESACB:
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Supervisor at Poznan University of Life Sciences:
Kamila Goderska

Castelo Branco, November 2010



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The doctrines expressed in this work are the sole
responsibility of the author.

This training report of the course Food and Biological Engineering was held in the laboratory of Microbiology at the Department of Fermentation and Biosynthesis of the Faculty of Food Science and Nutrition, Poznan University of Life Sciences under supervision of the Dr^a. inz. Kamilla Gorderska and of the Ph.D. student Tomasz Rychlik and by supervision of the Dr^a. Cristina Maria Baptista Santos Pintado at the College of Agriculture, Polytechnic Institute of Castelo Branco.

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Title: Probiotic bacteria in flax seed beverages

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Year: 2010

Abstract

Most probiotic foods at the worldwide markets are dairy-based and very few attempts were made for the development of probiotics cereal-based food. In the present work, a whole-grain flax seed substrate was fermented with lactic acid bacteria (LAB), particularly with *Lactobacillus paracasei* subsp. *paracasei* DSM 20312 and *Lactobacillus acidophilus* DSM 20079 to obtain probiotic beverages. Others substrates were fermented by those probiotic bacteria, such as, Bioflax® (milled flax seeds without fatty acids) and milled flax seeds with fatty acids. Therefore, was evaluated the levels of several factors, such as pH, the shelf life under refrigerated storage, the viable cells during 0h, 24h and 48h of fermentation at 37°C and the amounts of sugars and organics acids formed during the fermentation through HPLC analysis.

API test showed that the strain isolated from fermented milk product “Yakult” it is *Lactobacillus paracasei* subsp. *paracasei* DSM 20312. After pasteurization, a contamination of whole-grain by sporulated bacteria was observed, which was not observed after pasteurization of milled flax seeds and Bioflax®. By HPLC analysis it was observed a decrease of lactic acid levels and an increase acetic and propionic acids along the fermentative process. It was also observed that the levels of lactic acid are higher after 24 hours of fermentation. The results of storage time were not conclusive because a large proportion of samples were contaminated by sporulated bacteria after 52 days.

Keywords: Flax seed fermentation, non-dairy probiotic food, lactic acid bacteria, HPLC analysis, flax seed beverages

Título: Bebidas probióticas à base de sementes de linhaça

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Ano: 2010

Resumo

A maioria dos alimentos probióticos no mercado mundial são à base de laticínios e poucas tentativas foram feitas para o desenvolvimento de alimentos probióticos à base de cereais. No presente trabalho, foram fermentadas sementes de linhaça por bactérias lácticas (LAB), nomeadamente por *Lactobacillus paracasei* subsp. *paracasei* DSM 20312 e por *Lactobacillus acidophilus* DSM 20079 de modo a obter bebidas probióticas. Outros substratos foram fermentados por estas bactérias, tais como Bioflax® (sementes de linhaça moídas sem a presença de ácidos gordos) e sementes de linhaça moídas com a presença de ácidos gordos. Assim sendo, foram avaliados vários factores, tais como o pH, o tempo de vida do produto sob armazenamento refrigerado, a contagem de células viáveis durante 0h, 24h e 48h de fermentação a 37°C, bem como a determinação por HPLC da quantidade de açúcares e ácidos orgânicos que se formaram durante a fermentação.

A caracterização bioquímica por API confirmou que a estirpe isolada a partir da bebida fermentada “Yakult” é *Lactobacillus paracasei* subsp. *paracasei* DSM 20312. Verificou-se também que após o processo térmico de pasteurização surgiram contaminações por bactérias esporuladas, mas apenas nas amostras que continham como substrato as sementes de linhaça inteiras. Na análise por HPLC verificou-se que os níveis de ácido acético e propiónico aumentam à medida que o ácido láctico diminuiu e que em geral a quantidade de ácido láctico formado é mais elevada após 24 horas de fermentação. A determinação do tempo de vida das amostras após 52 dias de armazenamento não foi conclusiva, na medida em que surgiram contaminações por bactérias esporuladas.

Palavras-chave: Fermentação de linhaça, alimento próbiotico não lácteo, bactérias lácticas, análise HPLC, bebidas à base de linhaça
