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Utilisation of industrial potato by-products and their processing for novel food applications

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Lactic acid fermentation has traditionally been used in processing to preserve and improve the safety of the final products for various food applications. The purpose of this study was to test the feasibility of specific lactic acid bacteria (LAB) for fermentation of potato peel waste samples and to study the influence of the process on the quality of nutritional compounds, bioactive molecules and proteins.

LAB were isolated from industrial potato peel samples or alternatively commercial LAB starter cultures were applied. LAB were isolated from MRS-agar and identified by amplifying and sequencing their 16S rDNA. In laboratory scale processes the LAB were added to the peel samples and compared with the spontaneous fermentation. pH, numbers of *Enterobacteriaceae*, yeasts, moulds and LAB were determined by standard methods. Glycoalkaloids (GAs) (α -solanine and α -chaconine) and their transformation/breakdown products were analyzed by LC-pESI-MS. Ion trap instrument was operated in scan mode, which allowed both qualitative and quantitative analyses of the samples. The soluble proteins were analyzed by 2-D electrophoresis.

In most treatments, the quantities of GAs decreased efficiently. The main GAs in the processed samples were solanidine, α -solanine and α -chaconine. Other GA forms identified were β_2 -solanine, β_2 -chaconine and β_1 -chaconine. Compared to α -chaconine, α -solanine was less susceptible to breakdown into the altered GA forms. The diversity of isolated LAB was very extensive. The added LAB improved the fermentation quality compared with spontaneous fermentation. Of the nine tested LAB isolates and two commercial starter cultures, the most efficient proteolysis was obtained by strains PP3 and RS8.

The fermentation efficiency and quality of the final products can be improved by selected LAB cultures and the process can provide new alternatives for the utilisation of potato industrial side streams in novel food applications.

Keywords: glycoalkaloids, lactic acid bacteria, potato by-products, fermentation