P2.27 - FRUIT PEELS AS SOLID-STATE FERMENTATION SUBSTRATES FOR THE SUSTAINABLE PRODUCTION OF MICROBIAL PROTEIN

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ABSTRACT

Protein consumption is continuously increasing owing to the rise of the global population, which is expected to reach 9.7 billion by 2050, resulting in an unsustainable increase in demand for animal and plant foods. Microbial protein, an alternative protein source produced by microorganisms, has the potential to be incorporated into food and feed diets.

This study evaluated the potential of fruit by-products (orange and banana peels) as substrates for solid-state fermentation (SSF) to produce microbial protein with filamentous fungi. The main effects of several factors were studied in a Plackett-Burman experimental design at 2 levels: moisture content (60% and 75%), incubation time (7 days and 14 days), inoculum size (1×10^5 spores/g and 5×10^5 spores/g), nitrogen supplementation (0 g/g and 0.01 g/g), and fungal species (*Aspergillus ibericus* and *Rhizopus oryzae*).Total protein of fermented orange and banana peels increased by 179% and 46%, respectively, relative to non-fermented peels. The antioxidant activity of fermented peels increased 2.7- and 5-fold for orange and banana peels, respectively. Thereafter, the effect of moisture (50%, 60%, 70%), ammonium sulphate (0 g/g, 0.005 g/g, 0.01 g/g), and corn steep liquor (0 g/g, 0.005 g/g, 0.01 g/g) were studied in a Box-Behnken experimental design to optimize protein production by *A. ibericus*. The SSF process improved the nutritional value of fruit peels, increasing the total protein content by 239 % and 121 % for orange and banana peels, respectively. The results demonstrate that orange and banana peels are potential substrates for biotechnological production of microbial protein by *A. ibericus.* This process represents a step forward for food and industrial biotechnology owing to its potential to obtain a promising protein source with nutritional value and its positive impact on the environment through the valorization of discarded food-grade by-products.

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