

Cereal Bran Acid Pretreatment for Enhanced Bioactive Compound Production through Solid-State Fermentation

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Abstract

Solid-state fermentation (SSF) is a promising technique for producing bioactive compounds from cereal bran. However, the low concentration of bioactive compounds and the presence of lignocellulose hinder the efficient utilization of cereal bran for bioactive compound production. In this study, we investigated the effectiveness of cereal bran acid pretreatment for enhancing bioactive compound production through SSF. Cereal bran samples were pretreated with 3% sulfuric acid (H₂SO₄) and incubated for 2 hours at room temperature. The pretreated bran was inoculated with *Aspergillus niger* and incubated at 30°C for 7 days. The bioactive compounds, including phenolic compounds, and antioxidants, were analyzed using high-performance liquid chromatography (HPLC) and spectrophotometry. The results showed that acid pretreatment significantly increased the concentration of bioactive compounds compared to the control. The highest concentration of total phenolic compounds (20.9 mg gallic acid equivalents /100 g DW) was obtained on day 7 of fermentation and antioxidants (11.05 μmol TE/g DW) were obtained on day 2 followed by day 7 with a concentration of 10.2 μmol TE/g DW. The acid pretreatment also decreased the lignocellulosic content of cereal bran, resulting in increased accessibility of the microorganisms to the substrate. In conclusion, cereal bran acid pretreatment is an effective strategy to enhance bioactive compound production through SSF. This study provides valuable insights into the development of sustainable approaches for the utilization of cereal bran for the production of bioactive compounds with potential health benefits.

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