

FACTORS AFFECTING FERULIC ACID PRODUCTION FROM BANANA STEM WASTE BY FULL FACTORIAL DESIGN (FFD)

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Abstract

There are countless attempts on applying banana stem waste (BSW) as a feedstock for renewable energy, the materials are also known to be excellent substrate for various bioproducts. Ferulic acid happens to be one of the bioproducts that can be produced from BSW recognized to be great anti-oxidant compound and desired by pharmaceutical and food industries around the globe. This study employed enzymatic hydrolysis of feruloyl-polysaccharide from banana stem waste (BSW) by soil mixed culture (SMC) to produce ferulic acid (FA) using 25 full factorial design (FFD) to investigate the effect and interaction of these five factors affecting FA production: fermentation temperature (A; °C), agitation (B; rpm), water-to-BSW ratio (C;v/v), substrate-to-inoculums ratio (D;v/v), and inoculation time (E; days). The linear model was well fitted at R²=0.8019 with factors contribution percentages in the order of E > C > A > D > B. Inoculation time had 27.37% contribution indicating the importance of cell growth activities. The interaction of DE was highest since the SMC needs sufficient time for substrate utilization to get a high FA yield. The most FA output produced was 1.2187 mg FA/g BSW with parameters at ambient temperature, 150 rpm agitation, 1:1 water-to-BSW ratio, 1:1 substrate-to-inoculums ratio, and one day of inoculation. The hydrolysis process applied in this study found to be affected by various factors yet could be great option for production of ferulic acid. Meanwhile, BSW is proven feasible and great for producing ferulic acid naturally.

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