Pretreatment of Burley Tobacco Stalks as Raw Material for Bioethanol Production

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Tobacco stalks,as agricultural waste, due to the lignocellulosic composition can be evaluated as a potential raw material in bioethanol production. Pretreatment of lignocellulosic materials is the first step in the bioconversion process utilized to break down the lignin, open up the crystalline structure of cellulose, and its hydrolysis to sugars by application of acids or enzymes.[1]

The effect of the pretreatment time on the concentration of reductive sugars, lignin, and insoluble lignin in burley tobacco stalks was investigated. The pretreatment procedure involved immersingthe stalks in 4% H_2SO_4 at 80°C and ultrasound sonication for 30, 45, and 60 minutes. The tobacco stalks before and after pretreatment were characterized by the determination of the contents of reductive sugars using the dinitrosalicylic acid (DNS) method, insoluble lignin by the Klason lignin extraction method, and acid-soluble lignin by measuring the hydrolysate absorbance at 205 nm.[2]

Increasing the pretreatment time resulted in higher concentrations of reductive sugars, from 7.3 mg/L at 30 minutes to 11.2 mg/L at 60 minutes. The pretreatment time insignificantly affected the content of soluble and insoluble lignin. The insoluble lignin content decreased from 22.7% to 21.3% at pretreatment for 60 minutes. In the studied pretreatment conditions, the reductive sugar content increased, while the lignin was insignificantly degraded.

Keywords: Tobacco stalks, pretreatment, lignin, reductive sugars.

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