

ABSTRAK

PENGARUH SUHU DAN KONSENTRASI ASAM SULFAT TERHADAP KADAR GLUKOSA HASIL HIDROLISIS ASAM DARI LIMBAH KULIT PISANG KEPOK (*MUSA PARADISIACA*)

Taufaul Fadilah, 2026, 41 Halaman, 7 Tabel, 11 Gambar, 4 Lampiran

Indonesia merupakan salah satu produsen pisang terbesar dunia, dengan produksi mencapai 9,26 juta ton pada tahun 2024. Tingginya produksi ini menghasilkan limbah kulit pisang kepok dalam jumlah besar yang belum dimanfaatkan secara optimal. Kulit pisang kepok mengandung selulosa (60–65%), hemiselulosa (6–8%), dan lignin (5–10%), sehingga berpotensi dikonversi menjadi glukosa melalui hidrolisis. Penelitian ini mengkaji tiga hal utama: komposisi lignoselulosa hasil delignifikasi, kondisi terbaik hidrolisis, serta efektivitas pemurnian menggunakan NaOH. Delignifikasi dilakukan dengan NaOH 20% selama 3 dan 6 jam, sedangkan hidrolisis asam menggunakan konsentrasi H_2SO_4 0,5M dengan variasi (0,25–1,25%) pada suhu 90°C dan 100°C selama 90 menit. Hasil terbaik diperoleh pada delignifikasi 6 jam (selulosa 64,67%, hemiselulosa 17,67%, lignin 3,60%) dan hidrolisis pada suhu 100°C dengan H_2SO_4 1,25%, menghasilkan kadar glukosa 6% dengan yield 53,99%. Analisis ANOVA satu arah pada proses delignifikasi menunjukkan bahwa waktu perendaman berpengaruh nyata terhadap kadar lignin, selulosa, dan hemiselulosa. Kondisi hidrolisis terbaik dicapai pada suhu 100°C dan konsentrasi H_2SO_4 1,25%, menghasilkan kadar glukosa tertinggi sebesar 6% dengan yield 53,99%. Hasil ANOVA dua arah pada proses hidrolisis menunjukkan bahwa konsentrasi H_2SO_4 berpengaruh nyata terhadap kadar glukosa dan terhadap yield glukosa, demikian pula faktor suhu berpengaruh nyata terhadap kadar glukosa dan yield glukosa. Pemurnian dengan NaOH 10% berhasil meningkatkan pH dari 2 menjadi 5, sesuai SNI 01-2978-1992. Keberadaan glukosa dikonfirmasi melalui uji Benedict dan analisis FTIR. Meski hasilnya menjanjikan, kadar gula pereduksi yang diperoleh belum memenuhi standar SNI ($\geq 30\%$), sehingga optimasi lebih lanjut masih diperlukan.

Kata kunci: kulit pisang kepok, delignifikasi, hidrolisis asam, glukosa cair

ABSTRACT

THE EFFECT OF TEMPERATURE AND SULFURIC ACID CONCENTRATION ON GLUCOSE CONTENT RESULTING FROM ACID HYDROLYSIS OF KEPOK BANANA (*MUSA PARADISIACA*) PEEL WASTE

Taufaul Fadilah, 2026, 41 Pages, 7 Tables, 11 Figures, 4 Appendics

Indonesia is one of the world's largest banana producers, with production reaching 9.26 million tons in 2024. This high production generates a large amount of kepok banana peel waste that has not been optimally utilized. Kepok banana peels contain cellulose (60–65%), hemicellulose (6–8%), and lignin (5–10%), making them potential candidates for conversion into glucose through hydrolysis. This study examines three main aspects: lignocellulose composition resulting from delignification, best hydrolysis conditions, and the effectiveness of purification using NaOH. Delignification was carried out using 20% NaOH for 3 and 6 hours, while acid hydrolysis used 0.5M H₂SO₄ with varying concentrations (0.25–1.25%) at temperatures of 90°C and 100°C for 90 minutes. The best results were obtained with 6-hour delignification (cellulose 64.67%, hemicellulose 17.67%, lignin 3.60%) and hydrolysis at 100°C with 1.25% H₂SO₄, yielding a glucose content of 6% with a yield of 53.99%. One-way ANOVA analysis of the delignification process showed that soaking time significantly affected lignin, cellulose, and hemicellulose content. The best hydrolysis conditions were achieved at 100°C and 1.25% H₂SO₄ concentration, producing the highest glucose content of 6% with a yield of 53.99%. Two-way ANOVA results for the hydrolysis process indicated that H₂SO₄ concentration significantly affected both glucose content and glucose yield, and temperature also significantly affected both glucose content and glucose yield. Purification with 10% NaOH successfully increased the pH from 2 to 5, in accordance with SNI 01-2978-1992. The presence of glucose was confirmed through Benedict's test and FTIR analysis. Although the results are promising, the reducing sugar content obtained has not yet met the SNI standard ($\geq 30\%$), indicating that further optimization is still required.

Keywords: kepok banana peel, delignification, acid hydrolysis, liquid glucose