

**GLUCOSE PRODUCTION FROM CORNCOB BY MICROBIAL  
HYDROLYSIS USING BACTERIA ISOLATED  
FROM THAI HIGHER TERMITES**

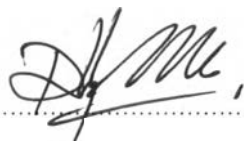
Nattawut Hokittikul

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**Thesis Title:** Glucose Production from Corncob by Microbial Hydrolysis  
Using Bacteria Isolated from Thai Higher Termites  
**By:** Nattawut Hokittikul  
**Program:** Petrochemical Technology  
**Thesis Advisors:** Assoc. Prof. Pramoch Rangsunvigit  
Prof. Sumaeth Chavadej

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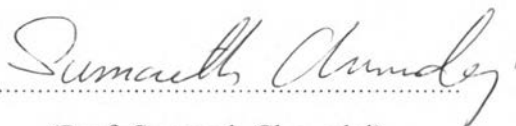


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## ABSTRACT

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Microbial hydrolysis of corncob to glucose by cellulase-producing bacteria (*Bacillus subtilis*) isolated from Thai higher termites, *Microcerotermes* sp., was investigated. Corncob consists of 43.82% cellulose, 39.62% hemicellulose, and 13.63% lignin. Each reactor contained corncob particles, bacteria cells, and production medium. The effect of particle size (40–60 mesh, 60–80 mesh, and 80–100 mesh), strain of bacteria (A 002 and M 015), and the concentration of secondary carbon source on the glucose concentration was investigated. In addition, glucose production using the isolated bacteria was compared with a commercial enzyme. High performance liquid chromatography with a refractive index detector was used to determine the quantity of glucose. The optimum condition of microbial hydrolysis using bacteria isolated from Thai higher termites was found to be 80–100 mesh of corncob particle, with strain A 002 at 37 °C. The maximum glucose concentration was 0.60 g/L at 8 h.

## บทคัดย่อ

ณัฐวุฒิ หอภิตติกุล: การผลิตกลูโคสจากซังข้าวโพดโดยกระบวนการย่อยด้วยจุลินทรีย์ที่แยกได้จากปลวกชั้นสูง (Glucose Production from Corncob by Microbial Hydrolysis Using Bacteria Isolated from Thai Higher Termites) อ. ที่ปรึกษา: รศ. ดร. ปราโมช รังสรรค์วิจิตร และ ศ. ดร. สุเมธ ชวเวช 65 หน้า

งานวิจัยนี้เป็นการวิเคราะห์กระบวนการย่อยซังข้าวโพดด้วยจุลินทรีย์ (Microbial Hydrolysis of Corncob) ให้เป็นน้ำตาลกลูโคส โดยใช้แบคทีเรียที่แยกได้จากปลวกชั้นสูงซึ่งมีความสามารถในการผลิตเซลลูเลส สำหรับการย่อยในแต่ละเครื่องปฏิกรณ์แบบกะประกอบไปด้วย ซังข้าวโพด แบคทีเรีย และแหล่งอาหารของแบคทีเรีย ซึ่งซังข้าวโพดที่ใช้ประกอบด้วย เซลลูโลส 43.82 % เฮมิเซลลูโลส 39.62 % และลิกนิน 13.63 % การทดลองนี้ศึกษาอิทธิพลของขนาดของซังข้าวโพด (40–60, 60–80, และ 80–100 เมช) แบคทีเรียบาซิลลัส ซับทีลิสสายพันธุ์ เอ 002 และเอ็ม 015 และปริมาณมอลท์ในแหล่งอาหารของแบคทีเรีย (6, 8, 10, และ 12 กรัมต่อลิตร) นอกจากนี้ยังทำการเปรียบเทียบปริมาณน้ำตาลกลูโคสที่ผลิตได้ระหว่างการใส่แบคทีเรียกับ เอมไซม์เชิงพาณิชย์ น้ำตาลที่ได้วิเคราะห์ด้วยเครื่อง HPLC (high performance liquid chromatography) พบว่าสภาวะที่เหมาะสมในการผลิตน้ำตาลกลูโคส คือ การย่อยซังข้าวโพดขนาด 80–100 เมช ด้วยแบคทีเรียสายพันธุ์เอ 002 ที่ 37 องศาเซลเซียส ซึ่งได้ปริมาณน้ำตาลกลูโคสสูงสุด คือ 0.60 กรัมต่อลิตร นอกจากนี้พบว่าปริมาณมอลท์สกัดที่ใช้มีผลต่อปริมาณน้ำตาลที่ได้ โดยปริมาณมอลท์ที่เหมาะสมคือ 12 กรัมต่อลิตร

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