



The Effect of CMC Coating Derived from Cellulose Extracted from Corn Husk on Slowing the Release of Phosphate Adsorbed by Biofertilizers

Pumrapee Chana^{1*}, Pawarisa Saenphich¹, Thunwarat Khunatep¹,
Natthawat Ai-kaew¹ and Thongpian Singchai¹

¹Princess Chulabhorn Science High School Chiang Rai, 345 Moo 2 Rob Wiang Subdistrict, Muang District,
Chiang Rai 57000, Thailand

*E-mail: 05785Pumrapee@pcccr.ac.th

Abstract

This project aimed to study the effect of Carboxymethyl cellulose (CMC) coating derived from corn husk on the delayed release of phosphate absorbed by biofertilizers, addressing concerns regarding excessive chemical fertilizer use that leaves persistent phosphate residues in soil. Biofertilizers were first prepared and subsequently used to absorb synthetic water containing 1.0 M dissolved phosphate ions. The amount of phosphate absorbed was quantified using Molybdenum blue method with UV-Vis spectrophotometer and compared with a standard calibration curve, indicating high phosphate uptake capacity by the biofertilizers. The phosphate-loaded biofertilizers were then coated with CMC extracted from corn husk cellulose, and FTIR analysis confirmed CMC identity, with CH₂ stretching at 1400–1450 cm⁻¹ and ether peaks at 1200–1000 cm⁻¹, matching characteristic functional groups of commercial CMC. To evaluate the effect of the coating on controlling phosphate release, the coated biofertilizers were immersed in synthetic water for 10 hours. Phosphate concentrations in the water were measured every 2 hours, revealing an average phosphate release of 4.386 mg/L, demonstrating effective delay compared to uncoated biofertilizers. Overall, the findings indicate that CMC coating derived from corn husk effectively slows phosphate release from biofertilizers and demonstrates strong potential for sustainable application in agricultural soil management.

Keywords: Biofertilizers, Carboxymethyl Cellulose, Phosphate