



PEMBUATAN *BEADS* ALGINAT-NPK DENGAN METODE *FREEZE-DRYING* SEBAGAI *CONTROLLED RELEASE* *FERTILIZER*

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INTISARI

Pembuatan *beads* alginat-NPK dengan metode *freeze-drying* sebagai *controlled release fertilizer* telah dilakukan. Penelitian ini bertujuan untuk mempelajari pelepasan NPK dari *beads* berdasarkan variasi konsentrasi pupuk dan membandingkan pengaruh metode *freeze-drying* dengan *air-drying* untuk efektivitas *controlled release fertilizer*. *Beads* dibuat menggunakan alginat, larutan pupuk NPK, dan larutan CaCl_2 0,5 M. Konsentrasi nitrogen, fosfor dan kalium yang dilepaskan masing-masing dianalisis menggunakan metode Kjeldahl, spektrofotometer UV-Vis, dan AAS (*Atomic Absorption Spectrophotometer*). Karakterisasi *beads* dilakukan dengan spektrometer FTIR (*Fourier Transform Infrared*) dan SEM (*Scanning Electron Microscope*). Kinetika pelepasan NPK dikaji menggunakan model orde satu, dua, dan Korsmeyer-Peppas.

Hasil penelitian menunjukkan bahwa pelepasan nutrisi dipengaruhi oleh konsentrasi, yakni semakin tinggi konsentrasi pupuk maka semakin besar konsentrasi nutrisi yang lepas. Pelepasan nutrisi dari *beads* Alginat-NPK pada pengeringan *freeze-drying* lebih besar dibandingkan *air-drying*. Laju reaksi pelepasan N, P, dan K mengikuti model kinetika Korsmeyer-Peppas.

Kata Kunci : *controlled release fertilizer*, fosfor, *freeze-drying*, kalium, nitrogen.



SYNTHESIS OF ALGINATE-NPK BEADS USING FREEZE-DRYING METHOD AS CONTROLLED RELEASE FERTILIZER

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ABSTRACT

Synthesis of alginate-NPK beads using freeze-drying method as controlled release fertilizer had been conducted. This research aims to study the release of N, P, K from beads with variation of NPK concentration and to compare effectiveness of controlled release fertilizer between freeze-drying method and air-drying method. Beads were prepared by mixing alginate, liquid fertilizer NPK and liquid CaCl_2 0.5 M. Concentration of nitrogen, phosphor and potassium released were analyzed using Kjeldahl method, UV-Vis spectrophotometer, and AAS (Atomic Absorption Spectrophotometer). The beads then were characterized using FTIR (Fourier Transform Infrared) and SEM (Scanning Electron Microscope). Kinetics study of releasing NPK evaluated using first, second, and Korsmeyer-Peppas equation order.

Results of the study showed that releasing of NPK is affected by NPK concentration which higher concentration NPK causes an increase of releasing rate of NPK. Nutrition released from beads with freeze-drying method was relatively higher than air-drying. Releasing rate of NPK followed Korsmeyer-Peppas equation.

Keywords: *controlled release fertilizer, freeze-drying, nitrogen, phosphor, potassium.*