

## **HIDROGEL KITOSAN-NPK TERTAUT SILANG GLUTARALDEHIDA DENGAN METODE PENGERINGAN FREEZE-DRYING SEBAGAI CONTROLLED RELEASE FERTILIZER**

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### **INTISARI**

Sintesis hidrogel kitosan-NPK tertaut silang glutaraldehida dengan metode pengeringan *freeze-drying* sebagai *controlled release fertilizer* telah dilakukan. Hidrogel dibuat menggunakan kitosan, pupuk NPK, dan glutaraldehida. Metode perendaman digunakan sebagai metode untuk mengetahui pelepasan nitrogen, fosfor, dan kalium dari pupuk. Kadar nitrogen, fosfor, dan kalium yang dilepaskan diukur menggunakan metode Kjeldahl, spektrofotometer UV-Vis, dan Spektrofotometer Serapan Atom (AAS).

Dalam penelitian ini dilakukan uji variasi konsentrasi pupuk dalam hidrogel, pengaruh pH, dan pengaruh metode pengeringan *freeze-drying* dan *air-drying* terhadap pelepasan nitrogen, fosfor, dan kalium, serta mempelajari kinetika pelepasan tersebut dengan menggunakan persamaan orde nol, orde satu, Higuchi, dan Kosmeyer-Peppas. Karakterisasi hidrogel dilakukan dengan spektrofotometer FTIR dan SEM (*Scanning Electron Microscope*).

Hasil penelitian menunjukkan bahwa laju reaksi pelepasan N, P, dan K mengikuti model kinetika Kosmeyer-Peppas, semakin besar konsentrasi nutrisi dalam hidrogel semakin besar pula konsentrasi N, P, dan K yang terlepas. Pelepasan nutrisi dari hidrogel dengan pengeringan *freeze-drying* relatif lebih besar dibandingkan *air-drying* karena adanya pori pada pengeringan dengan *freeze-drying*.

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

***HYDROGEL GLUTARALDEHYDE CROSSLINKED CHITOSAN-NPK WITH  
FREEZE-DRYING METHOD AS CONTROLLED RELEASE FERTILIZER***

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**ABSTRACT**

Synthesis hydrogel glutaraldehyde crosslinked chitosan-NPK with freeze-drying method as controlled release fertilizer had been performed. Hydrogel was made using chitosan, NPK fertilizer, and glutaraldehyde. Immersing was used a method to know the release of nitrogen, phosphor, and potassium from the hydrogel. The amount of nitrogen, phosphor, and potassium released was measured by Kjeldahl method, UV-Vis spectrophotometer, and Atomic Absorption Spectrophotometer (AAS).

Variations was tested in this research were the concentration of NPK in the hydrogel, effect of pH, and effect of freeze-drying and air-drying toward nitrogen, phosphor, and potassium release. Kinetics study of the release was using zeroth order, first order, Higuchi, and Kosmeyer-Peppas equation. Characterization of hydrogels were performed using FTIR spectrophotometer and SEM (Scanning Electron Microscope).

Results of the study showed that the release rate of N, P, and K followed Kosmeyer-Peppas equation, the greater nutrition concentration the greater released concentration of N, P, and K. Nutrition released from hydrogel with freeze-drying method was relatively higher than air-drying method because of the pore of hydrogel produced by freeze-drying method.

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