DEVELOPMENT OF SUPERABSORBENT CNF REINFORCED HYDROGEL FOR AGRICULTURE APPLICATIONS

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**Abstract**

Due to the lack of enough rainfall and water supplies for agriculture sector, water management is now more important for production of crop. A relevant measure might be the creation of a three-dimensional, crosslinked, hydrophilic, superabsorbent, biodegradable hydrogel with improved water retention and controlled release capability.A cellulose-based hydrogel was created by synthesising cellulose derivatives carboxymethylcellulose sodium salt (CMCNa) and hydroxyethylcellulose (HEC), cross-linking them with citric acid, and adding cellulose nanofibers (CNF) as reinforcement to increase the hydrogel's biodegradability and fortify its mechanical properties. Analysis was done on the chemical, physical, and water retention and release capacities. One carbonyl group was detected at 1731cm-1 by Fourier transform infrared (FTIR) spectroscopy, confirming the hydrogels production via ester linkage between the cross-linker and the cellulose chain. The impact of the hydrogel crosslinking process seen at XRD peak at 190⁰ has been demonstrated using the crystallinity index. The hydrogels pore structures can be shown in FESEM images to be dependent on the crosslinker concentration, and swelling study reveals that 10% CA concentration hydrogels have an absorption capacity increase upto 1000%. Water will be more readily available during cultivation easily to the good aplication of hydrogel, which will also help with water conservation. The incredible water retention capacity and enhanced hydrogel wall ultimate fracture point (mechanical strength), which are advantageous for agricultural applications, are what make this study distinctive.

**Keywords**: Cellulose based, Superabsorbent Hydrogel, CNF, biodegradable, Citric acid.

