Preparation of Carboxymethyl Cellulose from Water Hyacinth for Film Formation and Encapsulations

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Water hyacinth (Eichhornia crassipes) is an invasive alien species found in Thailand. It is harmful to the ecosystem and creates problems to the communities However, it has amazingly fast growth rate and provides high level of biomass therefore it is advantageous to be utilized as biomass. Since carboxymethyl cellulose (CMC) is a high-valued substance that can be produced from plant cellulose, the objective of this study was to utilize water hyacinth to produce CMC and develop it into film and capsules. High amounts of cellulose and CMC could be generated from water hyacinth abundantly found in Thailand. The process of delignination and cellulose extraction from water hyacinth could be done easily, with less amount of NaOH used than cellulose extraction process from most other biomass. The resulting CMC was formed into a film by addition of 0.5% glycerol (v/v). The film was then tested for tensile strength, elongation, clarity, and degradation. It was found that, in addition to low cost, the developed film had comparable properties to commercial CMC. Most importantly, the film was environmentally friendly and was able to decompose naturally within 9 hours. Moreover, to increase the value of the developed CMC, it could be used for Encapsulation with the ionic gelation process. The solution was then tested for encapsulation effectiveness, release rate and condition. The CMC 0.05% (w/v) was found to be effective for encapsulation process. This suggested that the developed CMC from water hyacinth could also benefit the capsule formulation development.

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