

Effect of sonication time on the thermal stability, moisture absorption, and biodegradation of water hyacinth (*Eichhornia crassipes*) nanocellulose-filled bengkuang (*Pachyrhizus erosus*) starch biocomposites

ABSTRACT

In Indonesia, starch, particularly that obtained from bengkuang (*Pachyrhizus erosus*), is abundant and inexpensive, thereby increasing the value of bengkuang starch, which can be mixed with bioplastic-based starch. A biocomposite comprising nanocellulose from water hyacinth (*Eichhornia crassipes*) and bengkuang starch was successfully fabricated using the solution casting method. Nanocellulose content in the matrix was kept constant at 1 wt%. Moreover, during fabrication, the biocomposite gel was treated in an ultrasonic bath for 0, 15, 30, and 60 min. Further, thermogravimetric analysis, moisture absorption measurements, Fourier transform infrared spectroscopy, and scanning electron microscopy were performed. The biocomposite sample vibrated for 60 min had the highest thermal stability and exhibited low moisture absorption. The soil burial test proved that this biocomposite, as opposed to 0-min vibrated samples, has a slower biodegradation rate. This result was supported by morphological evaluation after biodegradation, in which the 60-min vibrated samples showed a coarse surface and low porosity formation.

Keyword: Nanocellulose; Biodegradation; Biocomposites; Hyacinth fiber; Thermogravimetric analysis

