Bioplastic production from Guinea grass (*Megathyrsus maximus)*

B. D. A. Navodha, K. A. Sirisena

Department of Environmental Technology, Faculty of Technology, University of Colombo, Sri Lanka

Plastic pollution and dispersal of invasive plant species are among the most crucial environmental issues globally, contributing to ecosystem degradation and biodiversity loss. This study explores the potential of producing biodegradable plastics using cellulose extracted from the leaf biomass of an invasive grass *Megathyrsus maximus*. By converting an ecologically harmful species into a sustainable raw material, this research aims to provide an integrated solution to reduce the environmental impact of synthetic plastics while contributing to the management of invasive plant species. Three bioplastic formulations were prepared by combining *M. maximus* leaf cellulose with different additives: BPS1 (commercial starch), BPS2 (hydroxypropyl methylcellulose - HPMC), and BPS3 (*Alocasia macrorrhizos* tuber starch). Each sample was evaluated for moisture content, water interaction properties, mechanical strength, biodegradability, and surface morphology. Among the three formulations, BPS2 demonstrated the highest biodegradability (100%) and elongation at break (21.75 ± 0.02%), indicating strong eco-friendly potential and flexibility. However, it also exhibited poor mechanical performance (tensile strength 0.13 ± 0.05 MPa) and higher water solubility (100%). BPS3 showed the best overall properties with the highest tensile strength (1.49 ± 0.01 MPa), low moisture content (1.190 ± 0.29%), low water solubility (25.72 ± 0.27%), and superior morphology as confirmed by SEM analysis. BPS1 performed moderately in most aspects but had higher water absorption (48.59 ± 0.43%). While BPS2 is most biodegradable, BPS3 offers a more balanced and durable formulation, making it more suitable for practical applications that require strength and structural stability. Overall, the findings confirmed that the cellulose extracted from *M. maximus* can be effectively used in bioplastic production.

Keywords: *Megathyrsus maximus, Alocasia macrorrhizos, Bioplastic, Cellulose, Starch*