

Biodegradability of bioplastic film using different regions of *Pennisetum purpureum* incorporated with gelatine and chitosan

Abstract

The accumulation of plastic waste and rapid reduction of fossil reserves have pushed the development of packaging towards eco-friendly materials, such as bioplastics. However, most bioplastics are manufactured with chemical additives that are inorganic and entirely nondegradable. Therefore, bioplastics from renewable and biodegradable sources have been developed by incorporating cellulose, gelatine, and chitosan. This paper presents the optical properties, moisture content, swelling behaviour, assessment as packaging materials, and biodegradability tests of bioplastics. The considered bioplastics consisted of raw and cellulose from the whole, fibre, and bark of *Pennisetum purpureum*, with gelatine and chitosan fabricated using the solution-casting method. Cellulose was isolated using 8 wt% concentration of sodium hydroxide followed by 1.7 wt% concentration of sodium chlorite. The compatibility of fibre-matrix adhesion was improved by including cellulose from WPP, FPP, and BPP into the incorporation of chitosan and gelatine in bioplastics. Nevertheless, improving their optical properties, moisture content, and swelling behaviour had caused bioplastics to be more resistant to microbial activity and have the slower degradation rate. © 2022, The Author(s) under exclusive licence to Iranian Society of Environmentalists (IRSEN) and Science and Research Branch, Islamic Azad University.

Keywords

Biodegradability; Bioplastic; Chitosan; Fish skin gelatine; *Pennisetum purpureum*