DEVELOPMENT OF BIOPLASTICS FROM AGRO-WASTES

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Abstract

During centuries synthetic polymers have been used in a variety of applications in the everyday of human life. They became essential due to its versatility, durability and low cost [1]. However, due to their excessive use, several drawbacks as its resistance to the decomposition, toxicity after incineration and accumulation in the environment induce negative ecological impact in landfills and water contamination [2]. Moreover, plastics production implies the use of non-renewable resources, such as, oil and natural gas that represents about 8 % of global consumption [1,2]. Therefore, become crucial to search for new ecological materials toward innovative and cost-effective fabrication of environmentally degradable plastics demonstrating similar performance to conventional ones [1,3]. Simultaneously, the high amount of agro-wastes generated from food industry have been a growing concern, around 1.3 billion tons are leftover, which became an environmental and financial issue [1]. Among these agro-waste stands out, food waste, halum and stems of vegetables/fruits, grains and seeds, from which it is possible to obtain natural polymers [3]. Biopolymers exhibit unique properties and can be produced from plants and crops wastes. Rubber, proteins, starch and cellulose are some of the examples [4]. Cellulose has been used for the production of biopolymers, nevertheless, because of the difficulty inherent in its extraction process, various methods have been studied in order to optimize this process. Currently, cellulose derivatives are used, which is an example of cellulose acetate, whose chemical purification process is quite costly and lengthy [1]. Thus, the present work, aims to directly synthetize biopolymers from agro-wastes. Green chemistry methodology is applied to extract natural polymers, such as cellulose, from vegetable wastes. Structural, morphological and mechanical characterization of the produced materials are accessed and compared with conventional synthetic polymers. Also, biodegradability assays will be performed to check the microorganisms' capability to assimilate the produced bioplastics.

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