



BIODEGRADABLE MATERIALS AND THEIR APPLICATIONS



Edited By
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22 Impact of Biodegradable Packaging Materials on Food Quality: A Sustainable Approach

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Abstract

Food packaging sector is always dominated by petroleum-derived synthetic plastics, and it is estimated that the use of plastic will be reached to 500 million tonnes by the year 2050. The intention of food packaging is to offer safety to the food product from external environment without harming its internal qualities. Along with plastics, other conventional methods, such as glasses, metals, and paper, were also used in food packaging. But these conventional materials also bring problems related to their degradability, disposable methods and recyclability. Biodegradable resources have the possibilities to replace conventional plastics as they are completely degradable in nature and gives high mechanical properties. PHA, PHB, starch, cellulose, and their derivatives are now extensively used for the food packaging. Blending of these biodegradable materials with other plasticizers increases its mechanical strength, improves gas barrier properties, and also increases the production which makes them cost effective. Another application of biodegradable materials is that they are also used in edible food packaging. The future perspectives of biodegradable materials are very promising as they will generate 249.5 billion USD by the year 2050. This chapter highlights the need of biodegradable composites applied for food packaging and an exposure of the various biological materials that are used for its production.

Keywords: Food packaging, food packaging material, biodegradable material, PHB, food coating, edible food packaging

22.1 Introduction

The quality of food products is protected and preserved by food packaging, as a result, better sustainable food supply chain are created and food waste is reduced. Plastics have an extremely important role in food packaging in the preservation of food quality and protection, establishing suitable shelf life, and thus come up with less food waste [1, 2]. Some applications where plastics are widely used are packaging, for building materials, and commodities. Plastics are not biodegradable as derived from synthetic petroleum products and hence generating harmful environmental wastes [3]. In both developed and developing countries the excessive use of plastics can be witnessed [4]. In food packaging, massive number of single used nonrenewable and nondegradable materials are used [5] that creates severe environmental problems [4]. These single-use packaging materials are also a big challenge to waste management when discarded. Regarding PE and other petroleum-based polymers, it is extremely difficult to be deteriorate after throwing out in land or coast, leading to changeable levels of pollution [6]. The usage of polymers, however, poses major environmental difficulties due to its slow breakdown and the forecast exhaustion of the world's petroleum supplies [3]. Need for the use of bio-renewable and biodegradable materials for packing applications is increased due to different concerns especially environmental issues [4]. In the future, key issues for packaging materials are reduced (lightweight), renewable and recyclable [7]. As per to the Environmental Audit Committee, every day, around 700,000 bottles are dumped in the United Kingdom alone. Such statistics indicate the serious need for biodegradable packing solutions for beverages as well [8]. In addition to its minimal environmental effect, biodegradable packaging is gaining popularity due to increased consumer awareness, government attention on efficient packaging management and a rise in plastic bans.

22.2 Food Packaging

Food packaging refers to the outermost layer that protects food or food ingredients during processing, from manufacture to dispatch, until it reaches to the customers. Apart from that, it also includes all of the fundamental product information that buyers want. The major roles of packaging are categorized into four classes: containment, convenience, protection, and communication. The innovative progress of food preservation approaches was based on traditional packing [9].