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Short Communication

Evolution of Biodegradable Films by the Usage of Alginate Eggshells: Non-Biodegradable Waste in Concrete

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DESCRIPTION

Any organic material in garbage that can be broken down into carbon dioxide, water, methane, compost, humus, and simple organic molecules by microorganisms and other living things through composting, aerobic digestion, anaerobic digestion, or similar processes is considered biodegradable waste. Global concern about plastic pollution is driving initiatives to encourage the adoption of waste management techniques including incineration, recycling, and disposal, which help to reduce environmental pollution from greenhouse gas emissions [1-3].

The creation of plastic-free, biodegradable packaging has gained popularity in recent years. The fact that biodegradable films are compostable, edible, water-soluble, non-toxic, renewable, and environmentally friendly is one of its potential advantages. The least studied of biodegradable film's qualities, vermicomposting relies on the speedy breakdown of organic materials caused by a symbiotic relationship between earthworms and microorganisms. Vermicomposting is a quick, low-cost method for disposing of organic waste that is also very sustainable and environmentally benign because it emits less methane [4].

In order to create biodegradable films, combinations of sugars, proteins, lipids, waxes, and plasticizers were used. Biodegradable film composition must contain chemical, biological, and physical protection specifically for food and medical packing. Despite having good filmogenic qualities, carbohydrates typically produce stiff, brittle films with limited adhesiveness [5]. As a result, in order to create materials with the desired mechanical properties (i.e. flexibility, strength, elongation, and hardness), able to adhere to surfaces and/or contours, and suitable for use as coatings, carbohydrates must be combined with other ingredients such as proteins and/or plasticizers (which alone do not have film-forming properties).

The resistance of biodegradable films tends to be diminished when lipids are added to biopolymer blends, which is typically done to increase the permeability of water vapor or gases [6,7]. A certain ratio of fine aggregate, gravel, cement, and water is combined to make the ubiquitous composite material known as concrete. In doing so, concrete is able to reach the required strength level. It is frequently described to as the stone of a synthetic conglomerate because to its behavior, which is similar to rock in many ways, such as having great compression strength but a relatively low tensile stress strength [8].

Concrete can be produced in a wide variety of different forms by modifying the proportions of its constituent parts, the chemicals that are added, and the techniques employed to create it. Getting rid of trash that doesn't biodegrade, such plastic and other synthetic materials, on the other hand, causes huge problems throughout the world. The vast array of plastic products that have gained importance in modern life includes, but is not limited to, the following: packaging films and materials, sealing materials, shopping and trash bags, fluid containers, clothing, toys, domestic and industrial items, and so on [9].

It is produced at a rate of more than 150 million tons annually, with India producing more than 12 million tons of it all by itself. Plastics do not decompose in the environment and could stay there for a very long time because they do not biodegrade. Due to the fact that recovered plastics can contain chemical additives, stabilizers, colorants, and flame retardants, More materials must be discovered in order to produce cement [10]. Additionally, minerals like fly ash, bentonite, blast furnace slag, and others of this nature are frequently used. The compression strength of concrete increased dramatically when fly ash was used to partially replace sand, according to studies that compared the strength and durability of materials created using fly ash to those made using Portland cement alone.

CONCLUSION

Alginate/glycerol and eggshell powder-based films with biodegradable and compostable properties were created using an

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easy and affordable technique. The Eggshell Powder Biodegradable Films (EPBFs) had a whitish, opaque appearance, a heterogeneous, rough microstructure, and little porosity. On the polymeric matrix, where the eggshell particles were dispersed in a monolithic pattern, interactions may have developed between the matrix's functional elements, EP functional groups, and the proteins that make up the shell membrane. The main benefit of finishing this project is an improvement in workability brought on by a reduction in the amount of water that will be absorbed by the plastic. Additionally, there is less environmental contamination, less fine aggregate, and a lower overall cost of materials.

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