

Development of thermo-bioplastic material based on starch.

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Abstract

Plastic bags and polythene wraps are among the mostly used packaging materials on daily basis. Most of them are made up of fossil-based non-degradable plastics. Growing concerns regarding the prevention of environment pollution, waste management issues, and depletion of non-renewable resources such as fossil fuels have focused research efforts in finding materials based on renewable resources that are environmentally friendly. Therefore replacing these non-degradable food packaging with biodegradable polymers would reduce the amount of waste generation and vital when moving towards green chemistry. Starch, a natural polymer displays thermoplastic behavior under certain circumstances. Therefore starch can be considered as a candidate that can replace synthetic non-biodegradable polymers. This study is focused on developing a starch film with substances that are known as safe for human consumption with the aim of using it as a food wrap.

Starch was extracted from the selected tubers and roots (potato, sweet potato and cassava) that are commonly available in Sri Lanka. Extracted starch was analyzed for moisture, ash, fat and protein content and then used to develop starch films by casting technique. Acetic acid and sodium bicarbonate was used in the process and glycerol was used as the plasticizer. Film forming formula was developed by varying the amount of starch, and amount of glycerol while maintaining the pH of the film at pH 7. Prepared starch films were tested for their tensile strength and breakage elongation. Thin starch films could be obtained with this method which are water soluble. Films with less amount of glycerol and high amount of starch were rigid and films with high amount of glycerol and low amount of starch were sticky and brittle.

Keywords: starch, biodegradable polymers, thermoplastic