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Flexible bioplastics composites based on lipophilic corn starch and gelatin plasticized with glycerol

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The demand for high quality food and concerns about the disposal of packaging materials from non renewable raw material, lead the researchers to find ecological alternatives as the utilization of bioplastics, which can also be edible.

In this work, we developed flexible bioplastic composites based on lipophilic corn starch and gelatin plasticized with glycerol (20% compared to the mass of starch), obtained by thermoplastic extrusion process, followed by blowing for film formation. To assess the influence of gelatin addition in bioplastics, several concentrations like 0%, 10% and 20%, compared to the mass of starch, were studied. All biofilms were characterized by the barrier properties (permeability to water vapor), mechanical (tensile strength and elongation), physical-chemical properties (water solubility) and physical (density and thickness).

To obtain the pellets and then the flexible edible and biodegradable films, we used a brand BGM extruder (model EL-25, Sao Paulo, Brazil). The pellets, used for feeding the blowing extruder, were obtained in a single step, what helped the films plasticization and reduced the processing time, making this technique more advantageous for industrial application.

The bioplastics produced did not show insoluble particles or fractures, and the balloons of 12 to 14.5 cm in diameter, formed during the blow (Figure 1), were also visually homogeneous. The width of the biofilms ranged from 250 to 290 mm (Figure 2). All films produced could be wrapped automatically without suffering wall adhesion and compression.

Figure 1. Lipophilic starch bioplastic being formed by blowing.

Figure 2. Bioplastic ranged

Bioplastics were stored at 25°C and 50% RH before their analysis.A thickness of the biofilms produced with glycerol increased, with the addition of 10 and 20% of gelatin in the mixture, from 0.099 to 0.124 mm and 0.147 mm, respectively.

The addition of gelatin caused a decrease in the amount of water vapor permeability of bioplastics, from 16 to 6 gmm/m2dkPa gmm/m2dkPa, with the addition of gelatin to the mixture, but did not influence their solubility in water or opacity.

The films showed higher values of opacity when compared to synthetic polypropylene film. When the mechanical properties of bioplastics were obtained in longitudinal and

transverse directions, it was observed a greater difference in tensile strength for the simple starch bioplastics. The addition of gelatin caused a significant increase in tensile strength of biofilms in both directions studied, but did not affect their elongation.