Formulations of Bioactive Films Based on Babassu Coconut Starch Added with Cellulose Nanofibers and Curcuma longa L. Essential Oil

Diedrichs, Rennzo (School: Federal Institute of Tocantins)
Pinesso, Guilherme (School: Federal Institute of Tocantins)

Given the growing environmental impact caused by synthetic plastic waste — with Brazil generating around 4.9 million tons of plastic waste per year, of which only 1.2% is recycled — the development of biodegradable and functional packaging materials has become an urgent necessity. We developed bioactive films from babassu coconut starch (Orbignya phalerata Mart.), cellulose nanofibers, and turmeric essential oil (Curcuma longa L.) as a sustainable alternative to conventional plastics. Our objective was to evaluate their physical, chemical, and functional properties, such as morphology, thickness, mechanical strength, solubility, water vapor permeability, and degradation. For this purpose, we used the casting method, varying the film composition based on an experimental design. The tests demonstrated that the incorporation of nanofibers and essential oil improved mechanical strength and reduced solubility, while also enhancing water vapor permeability due to the presence of crystalline zones in the material. The films showed degradation in soil, confirming their biodegradability. We conclude that this approach can serve as a viable alternative for sustainable packaging, reducing the environmental impact of synthetic plastics.

Awards Won: