

Cellulose extracted from oil palm empty-fruit-bunches as reinforcing agent for starch films

Valérya Carneiro Teles¹, Larissa Andreani¹, Leonardo Fonseca Valadares¹

¹Embrapa Agroenergia

e-mail: valeryateles@gmail.com

This work investigates the reinforcement effect of microfibrillated cellulose on starch and glycerol films. The water activity and color difference of the materials were also measured aiming food packing applications. An oil palm empty-fruit-bunch belonging to cultivar 2301, Tenera, was used as raw material. Cellulose purification was performed according to Fahma *et al.* [1]. The purified cellulose was subjected to shear of 24,000 rpm during 120 minutes in an Ultraturrax Disperser. The films were prepared by casting and evaporation process using different contents of microfibrillated cellulose (0.0; 0.5; 1.0; 2.5; 5.0 and 10.0 %). The mechanical tests were performed using the standard method for thin films [2]. The water activity was determined using AquaLab analyzer. The color difference analysis was performed using colorimetry. The tensile strength increases with microfibrillated cellulose addition, as follows: 1.22 ± 0.15 MPa for 0.5% of cellulose; 1.33 ± 0.48 MPa for 1.0%; 1.97 ± 0.39 MPa for 2.5%; 2.32 ± 0.32 MPa for 5.0%; and 3.59 ± 0.68 MPa for 10.0%. The modulus of elasticity and elongation at break also increase, showing improved the stiffness of the resulting materials with high cellulose content. The addition of cellulose had no influence on the water activity of the films (below 0.51 ± 0.01). However, the color parameters show the formation of translucent films with cellulose.

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References:

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- [2] ASTM International, D 882-02. Standard Test Method for Tensile Properties of Thin Plastic Sheeting.