TUBER (*Discoreaceae*) STARCHES MIXTURE FOR BIODEGRADABLE STARCH FILM DEVELOPMENT

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Starch can replace most of petrochemical materials origin in the packing industry and reduce costs due to its unlimited availability. Yam tubers from the *Discoreaceae genus* are rich in starch (up to 70 %) and despite their economical value, only limited literature is available. In Brazil, the *Dioscorea tubers* are mostly consumed as food staples. Therefore, the *Dioscorea yams* application for processed products could increase their agricultural demands contributing to the economic growth of developing countries such as Brazil. Thermoplastic starch packing materials are biodegradable and can be edible. However, these materials can be brittle and lacking in mechanical resistance and flexibility. Mixing starch with other starches from different botanical origins could improve these characteristics. Thus, the aim of this work was to characterize starch films obtained by mixing three *Dioscoreaceae* starches and to study their resultant mechanical properties. A 3-component simplex centroid design (n = 7 assays) augmented with n = 3 central points to compose a total of 10 samples was applied. The starch samples were coded as follows: 1, 2, 3 (D. sp. (a), D. piperifolia (b) and D. Trífida (c), respectively) native (unmixed) samples. The mixed starch samples were coded 4 to 10 (4 – 50/50 % a/b; 5 – 50/50 a/c; 6 – 50/50 b/c; 7 – 33/33/33 a/b/c; 8 – 66/17/17 a/b/c; 9 – 17/66/17 a/b/c; 10 – 17/17/66 a/b/c). The films obtained by casting (0.88 g sample mixed with glycerol 0.44 g and distilled water 20.68 g) from the mixtures showed low moisture content (10.41 %) and transparency (A600/mm 1.0 to 1.8) high solubility (40.8 to 49.7 %), and significantly different thickness (0.1 to 0.13 mm). The films also presented improved light barrier (%, T600 12.6 to 17.1) and enhanced water vapor permeability barrier properties (after mixing decreased 0.11 g mm m-2/ h kPa). Using differential scanning calorimetry (DSC), it was possible to observe that the glass transition temperature of the films decreased (11 ºC – sample 7) and the melting temperature increased (31 ºC) when sample 10 mixtures of starches were used. The process improved the mechanical characteristics of the films from 19 to

22 MPa for tensile strength and from 33 to 39 % for elongation at break. The starch mixtures increased the solubility as desired for biodegradability and was obtained films with high resilience and flexibility. The films produced may provide different characteristics for use in numerous applications.

Palavras-chave: biodegradable package, tensile strength, elongation at break