Characterization of biodegradable films of cassava starch added of freeze dried Barbados cherry (*Malpighia* sp.)

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Abstract – In order to understand the mechanism of film formation using starch based material, filmogenic suspension of cassava starch and freeze dried Barbados cherry (BC) (0, 5, 10, 15, 20 and 25%) were prepared in a Haake Mars rheometer equipped with a optical microscope to follow up and gelatinization process. Microscope readings showed that starch granules were either swollen or melted when the temperature reached 90°C and addition of BC gradually reduced paste viscosity.

Edible films are fine membranes made of varied natural food sources that can be used as packing to protect food products and, in addition, can also have additives like vitamin C with the advantage of being safely consumed. The aim of this study was to use freeze dried Barbados cherry (BC) (0, 5, 10, 20 and 25%) into cassava starch films. In order to produce the films, filmogenic suspension were prepared in a Haake Mars rheometer (Thermo Scientific, Karlsrueh, Germany) equipped with an optical microscope with 20x lens Rheoscope (Thermo Scientific, Karlsrueh, Germany) at temperature profile of heating up to 90°C (2°C/min) and cooling to 50°C (1°C/min) totalizing 40 min run. During the analysis a digital image was recorded each 10s period with its viscosity data. When cassava starch filmogenic solution is compared to the samples added of BC, it is possible to observe a considerable drop in paste viscosity, particularly when the addition was 10% or higher. No difference is observed for the filmogenic solutions viscosity at 20 and 25% BC addition (Figure 1). It also interesting to observe that there is no sudden drop in viscosity after reaching the maximum viscosity around 90°C, which indicates that BC may stabilize the gel formation by biding the starch molecules. Among the samples with BC the higher was the paste viscosity at 5% that was kept high and constant even after the peak viscosity, which suggests its use as an ingredient for gel stability (Figure 1). By comparing the images of 0 and 25% BC, it is possible to observe the starch ghosts and also a more homogeneous remnants swollen starch distribution can be seen (Figure 2) particularly when BC was added. In the work of Tan [1] with the help of the Rheoscope, they found that the addition of guar gum was necessary to facilitate the starch gelatinization keeping the starch granules in suspension.

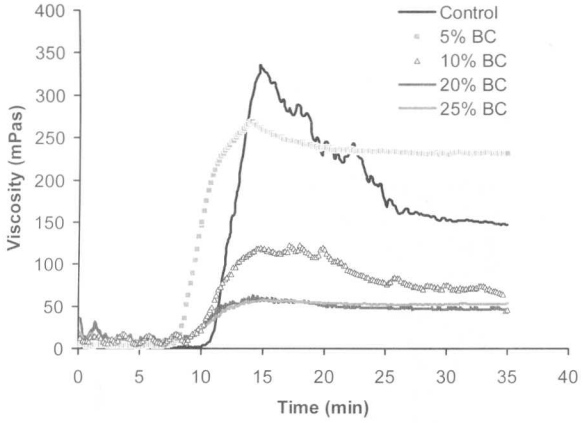

Figure 1. Viscosity curve of varied concentration of freeze dried Barbados cherry and cassava starch in filmogenic solution.

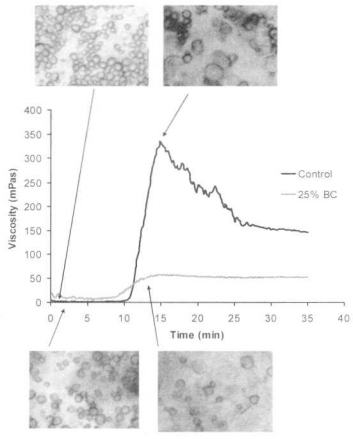

Figure 2. Microscope images of cassava starch (control) and 25% Barbados cherry (BC) filmogenic solutions. The top images represent the sample control.

[1] Ihwa, T., Torley, P.J., Halley, P.J. Carbohydrate Polymers, 72, 272-286, 2008.