Effect of heat treatment on rheological properties of bambangan (Mangifera pajang Kosterm) fruit juice

ABSTRACT

Bambangan (Mangifera pajang Kosterm) is an indigenous fruit that can be found in Borneo Island including Sabah and Sarawak (Malaysia), Kalimantan (Indonesia), and Brunei. Besides being eaten fresh, the pulp of bambangan fruit can be processed for juice production and expand its market potential. During the fruit juice processing, application of heat treatment such as pasteurization and sterilization might influence their rheological behavior. Thus, the present study aims to investigate the effect of heat treatment on the rheological properties of bambangan fruit juice (BFJ). The freshly squeezed BFJ was subjected to different heat treatment conditions; sterilization (121°C, 3 minutes), mild temperature long time (MTLT) pasteurization (65°C, 15 minutes), and high temperature short time (HTST) pasteurization (90°C, 1 minute). Rheological analysis of the heat-treated BFJ was performed using a rheometer at a shear rate ranging from 1 to 250 s-1and a temperature between 5°C to 70°C. Pasteurization at 90 °C for 1 minute (HTST) was found to be the most suitable heat treatment for the BFJ. At this condition, the BFJ exhibited a non-Newtonian pseudoplastic fluid behavior ($n < 1$), fitted well with the Herschel-Bulkey model. The value of parameters obtained from Herschel-Bulkley equation for HTST treatment of bambangan juice were $n = 0.83$, $k = 0.32$ and yield stress= 3.96. The viscosity values of HTST bambangan juice at the temperature of 5, 20, 40 and 70 °C were 3.53, 2.33, 1.53 and 1.76 Pa.s respectively. This rheological information is of fundamental importance in optimizing equipment design, process control, and sensory evaluation.