DE SILOS, PAOLO YVES LAZARO. College of Engineering and Agro-Industrial Technology, University of the Philippines Los Baños. June 2017. **Mechanical Production of Cellulose Nanofibrils (CNF) from Bleached Kawayan Tinik (*Bambusa Blumeana* Schult.f.) Pulp: Effect of Holocellulose Preparation and Number of Passes in the Supermass Colloider.**

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The study dealt with the determination of the effects of holocellulose preparation and number of passes in the mechanical production of cellulose nanofibrils (CNF) from bleached Kawayan Tinik (*Bambusa blumeana* Schult.f) pulp. Pretreatment of bamboo included removal of branches and outer skin, cutting into rings, chipping, soaking in water, air-drying, and hammer milling. Kraft pulping was done, using NaOH and Na2S with sulfidity of 15% and alkalinity of 18%. Pulp bleaching using Zonrox® containing 5.25% sodium hypochlorite was done to remove the majority of lignin present in the pulp. A portion of the bleached pulp underwent the sodium chlorite treatment to isolate the holocellulose by removing extractives, residual lignin, and some hemicelluloses. The amount of acid-insoluble lignin present in the raw bamboo, Kraft pulp, bleached pulp, and holocellulose was determined. The bleached pulp and holocellulose at 1% consistency, were separately made to pass for a predetermined number of cycles in the supermass colloider to produce CNF. The yields were calculated, with ultimate values of 73.52% (200 passes) and 66.02% (300 passes) for the bleached pulp and holocellulose preparation, respectively. Optical microscopy was done to monitor the changes in the morphological characteristics of the CNF during the initial passes, while Scanning Electron Microscopy (SEM) showed the nanosize dimensions of the final product with an average diameter of 58.35 nm and an average length of 2169.26 nm. Dynamic Light Scattering (DLS) showed a homogeneous particle size distribution. In addition, the functional groups present in the CNF from bleached pulp and holocellulose were analyzed using Fourier Transform Infrared (FTIR) Spectroscopy and showed that the CNF samples contain peaks for O-H, C-H, and C-O-C stretching, but lacks groups related to lignin. X-ray Diffraction (XRD) analysis showed that the crystallinity of the CNF increased to 71% compared to the 60% from literature. Statistical analysis using the Stat-Ease Design Expert v10.0 Trial Version and the Statistical Tool for Agricultural Research v2.0 showed that holocellulose preparation and number of passes in the supermass colloider had significant effects on the CNF yield, length, width, and aspect ratio. The holocellulose which was made to pass the colloider for 200 times gave the highest yield and the morphological characteristics closest to reported literature values. For bleached pulps, the number of passes in the supermass colloider had significant effect on the CNF length and width.