Effects of Operational Variables on the Pulp Yield and Lignin Dissolution of Cyperus Articulatus

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Abstract

The influence of operational variables on the pulp yield and lignin dissolution of Cyperus articulatus was studied. The study was aimed at optimizing pulping variables and selecting suitable delignification conditions for the production of pulp and paper from the plant. Cyperus articulatus chips were delignified in a laboratory pulpwood digester under the soda pulping process using the following pulping conditions: time (30 – 150 minutes), temperature (120 – 150°C), liquor to solid ratio (10:1 – 20:1) and concentration of cooking liquor (4 – 6% caustic soda). Experimental data were fitted into a central composite design and the polynomial equation derived reproduced the pulp yields and the residual lignin contents with errors less than 6%. Optimum pulp yields were obtained using low values of the process variables while the reverse was the case for the residual lignin. Pulping at high temperatures for a short cooking time with low to medium concentration of pulping liquor gives the best compromise for both pulp yield and residual lignin content.

Keywords: Cyperus articulatus, soda pulping, pulp yield, residual lignin.