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VALORIZATION OF CROP RESIDUES FROM FALSE BANANA/ENSETE VENTRICOSUM/PLANT AS PULP AND PAPER RAW MATERIAL

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False banana /Ensete ventricosum [Welw.] Cheesman/ is exploited as a food crop in Ethiopia where it represents an important staple food. The plant is harvested and large amounts of biomass residues are originated, mainly from the pseudo stem (i.e., fiber bundles obtained from the leaf sheaths after being scrapped to produce starchy food) and the inflorescence stalk. The fiber was studied in relation to their summative chemical composition, composition of lignin, lipophilic and polar extracts and their structural characteristics, in view of their valorization, were scrutinized. Moreover, its delignification by using total sulfur free ethanol/alkaline pulping was also investigated in the present study. The analytical studies were performed with the aid of FTIR, GC/MS, Py-GC/MS and SEM. The fiber bundles are aggregates of mainly long and slender fibers with low ash, extractives and lignin contents (3.8%. 4.4% and 10.5% respectively) and high holocellulose and α-cellulose contents (87.5% and 59.6% respectively). The hemicelluloses in the fibers are mostly highly acetylated xylans and the lignin is of the H-type (H:G:S, 1:0.7:0.8). These fiber bundles could be used as a fiber source for paper pulp production with the possibility of a previous hemicelluloses removal. Response surface methodology, central composite experimental design was used to evaluate the effects of four independent variables (cooking temperature, time, ratio of ethanol/water and alkaline concentration) on the response such as pulp yield, kappa number, brightness (Tappi), whiteness and yellowness of pulp and paper. Under optimal pulping condition, the response values were 69.9% pulp yield with 4.9 kappa number. The tappi brightness, whiteness and yellowness of the paper were 64.5, 25 and 22.2 respectively. The pulp and paper obtained under the optimal condition was characterized by its viscosity, cristallinity index and physical property of the paper and compared with kraft pulp. Ethanol/alkaline pulp and paper have comparable strength, yield and viscosity to kraft pulp of false banana fiber.

Biography

Hanna Berhanu has completed her master degree in process engineering from Addis Ababa Institute of technology. She is experienced Visiting Researcher with a demonstrated history of working in the renewables and environment industry. Skilled in Statistics, Research, Chemistry, Matlab, and Lecturing. Strong research professional with a Master's Degree focused in Process Engineering from Addis Ababa Institute of technology. She is the visiting professor of Instituto Superior de Agronomia and currently works as a lecturer at wolkite University.

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