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# Isolation of Cellulose from Selected Sri Lankan Rice Husks in Environmental Friendly Procedure

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## Abstract

Rice is the main food crop plant in agricultural economy based country like Sri Lanka, which cultivates in two main seasons annually known as "Yala" and "Maha". Thus rice husk is one of the most frequently abundant agro-waste yielded over 20% of the paddy harvest. According to the statistics it revealed that on average, about 200 kg of rice husks (RHs) were produced from one ton of paddy harvest. Nevertheless, this crop residue is considered as an agro-waste which burns in open fields. Thus for the reduction of recent environmental issues such as disposal, respiratory problems and global warming, utilization of RHs leading to a value added product is an alternative solution. RH is a frequently available agricultural waste containing cellulose as the major which has been identified as a frequently available renewable energy source of naturally occurring biodegradable polysaccharide. Thus isolation of cellulose from RHs and use in industrial applications would be a convenient solution for the value addition of agro-waste. Traditional varieties of RHs in Sri Lanka, Pachchaperumal, Kahawanu and Heenati and one of the frequently consuming genetically improved variety, BG-300 were the RHs mainly focused in this study. Highly purified cellulose was successfully isolated from RHs of various types including a series of steps as de-waxing, alkali pretreatment followed by bleaching process. De-waxing through soxhelet extraction and alkali pretreatment by sodium hydroxide was conducted to remove non cellulose constituents in the RHs. Chlorine free environmentally friendly bleaching process using hydrogen peroxide ($H_2O_2$) was continued for further removal of non cellulose materials, hemicellulose and lignin. FTIR spectroscopy and TG analysis were used to analyze the isolated cellulose. A range of 37-38 wt% and 35 wt% of cellulose was successfully extracted from RHs of traditional varieties and genetically improved variety, BG-300 respectively. The substitution of an eco-friendly bleaching agent, $H_2O_2$ instead of chemicals containing chlorine compounds was a significant step which resulted the ability of extracting white-pale yellowish cellulose powder with higher efficiency rate via only over two times of bleaching cycles. This procedure confirmed the ability of extraction of cellulose with high purity from biodegradable wastes; RHs can be used for many industrial applications as a value added product.

***Keywords*:** Rice husks, Cellulose, Agro-waste, Polysaccharide