

Extraction of silica from selected Sri Lankan traditional rice husks

G.S.P. Fernando, P. Godakumbura* and M.A.B. Prashantha

*Department of Chemistry, Faculty of Applied Sciences, University of
Sri Jayewardenepura, Sri Lanka
pahanig@gmail.com*

Rice is a staple food in Sri Lanka and most of the other South Asian Countries. Rice husk (RH) is one of the most abundant agricultural wastes available in rice producing countries. Following the green concept, there is a significant interest of converting this waste material into useful value added product. RH can be used as a fuel and then as the silica source. Gonabaru, Kahawanu, Patchaperumal, Dahanala and Suwandel are some of the traditional rice varieties, which are becoming popular due to the awareness of medicinal and nutritional values. The objective of this research is to extract silica from traditional RHs.

Moisture content, ash content, volatile matter and fixed carbon of RH were determined as the proximate analysis of RH, comparatively with that of the improved one. Ash content of RHs of traditional rice varieties (more than 20.0%) was higher than that of the genetically improved one (~13.1%). Acid washing step is required to purify white rice husk ash (WRHA). The mineral content of WRHA was determined using atomic absorption spectrometer (AAS). WRHA of both traditional rice varieties and genetically improved rice variety (BW 364) contains relatively higher amount of K (0.97% - 1.24%). But WRHA of traditional rice varieties contains lower content of Fe (0.01% - 0.02%) and WRHA of BW 364 contains lower content of Mn (~0.006%). Percentage of reduction (PR) of minerals has been calculated. According to the PR values, almost all the minerals have been leached out through the acid washing step.

Acid washed WRHA was used to extract silica as it is an economically valuable material. High silica content was extracted from RHs of traditional rice varieties (more than 23.0%) than that of BW 364 (~16.2%). Major chemical groups present in rice husk silica (RHS) were determined using fourier transform infrared (FTIR) spectra. FTIR spectrum of RHS was almost similar to the FTIR spectra of commercially available precipitated silica and silica used for thin layer chromatography (TLC - GF254). TLC plates prepared using RHS worked almost similar to the laboratory available TLC plates. Therefore there is a potential usage of RH.

Financial support given by University of Sri Jayewardenepura is acknowledged.