INVESTIGATION OF STRUCTURAL CHARACTERISTICS AND THERMAL PROPERTIES OF ASH CARBONISED FROM LOCALLY AVAILABLE RICE STRAW VARIETIES

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Sri Lanka being an agricultural country generates a significant amount of rice straw per annum as a by-product from rice production. As a general practice, rice straw is either burnt or ploughed into the field without being converted into a productive output. However, rice straw has a very high potential for the production of very effective secondary raw material such as filler in rubber compounds and pozzolanic material for cementing systems due to its random availability, very high silica content and relatively low cost. After burning rice straw at a controlled temperature, around 10 to 15 percent of mass rice straw is converted into high quality value added ash. Rice straw ash is rich in silica, alkaline and alkaline earth metals which can be used as a source of alkalis and silica in industrial applications. In this research, locally available rice straw varieties BG352 and Murunkan were converted into rice straw ash by carbonizing them at 550 ˚C for 6 hours. An extensive analysis was performed on rice straw ash to investigate its structural, morphological and thermal characteristics using X-ray diffractometer, scanning electron microscopy (SEM), and thermogravimetric analysis (TGA). The study reveals that the above rice straw varieties contain around 10 percent of ash with 70 - 75 percent silica rich residue. SEM micrographs show dispersion of silicon compounds dispersed across the rice straw ash surface. Presence of silica in amorphous form was confirmed in x-ray diffractogram along with secondary minerals arcanite and calcite. Crystalline percent of both rice straw and straw ash of the Murunkan variety is higher than that of BG352. Thermal analysis showed four endothermic peaks for rice straw ash where the third peak located between 600 - 850 ˚C is attributed to the amorphous silica. Thermal analysis also exhibits greater weight loss with lower crystallinity. It can be concluded that rice straw ash derived from locally available rice straw varieties BG352 and Murunkan can be employed as a silica rich source in industrial applications.

Keywords**:** Agricultural waste, Rice Straw Ash, Value addition, Structural characterisation, Thermal properties

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