

AN INNOVATIVE METHOD FOR APPLICATION OF RICE HUSK ASH IN LOW LAND RICE CULTIVATION TO ENHANCE THE SOIL FERTILITY IN SRI LANKA

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Rice husk is an agricultural waste abundantly produced in the paddy milling process and contains a considerable amount of silica ash. Rice husk is industrially combusted under various temperatures for various purposes, such as energy for boilers in rice milling plants. Rice mill furnace residues mostly consist of rice husk ash, which leads to environmental pollution if they are not managed properly. The lightweight nature of rice husk ash, coupled with its low bulk density, contributes to enhanced soil pH, improved aeration in the crop root zone, and increased water-holding capacity. Additionally, it augments the level of exchangeable potassium, providing several advantages for soil and crop health. Hence, as a remedy for managing rice mill furnace residues, it can be utilized as a beneficial soil amendment in rice cultivation. Consequently, a rice husk ash applicator was designed, manufactured, and tested to incorporate rice husk ash into the soil simultaneously with the tillage process. The design prioritized higher efficiency, precision, minimal additional work, ease of operation, and low time, and labour consumption. A riding-type two-wheel tractor was chosen as the power source, with key components and systems including the ash hopper, metering mechanism, power transmission system, and data recording and display systems. Performance of the designed applicator was tested at the paddy fields of the Faculty of Agriculture, Rajarata University of Sri Lanka, featuring Low Humic Gley (LHG) soil with three replicates. The computed average values for field capacity, field efficiency, and fuel consumption were 0.0885 ha h⁻¹, 82.17%, and 8.9 L ha⁻¹, respectively. Since the application is integrated into the secondary tillage process, the additional time and fuel consumption can be justified. The results indicate satisfactory performance of the applicator, suggesting potential for further development and comprehensive evaluation under various field conditions.

Keywords: Ash Applicator, Paddy cultivation, Soil amendment, Tillage process