Preparation of Rice Husk and Paddy Straw Bricks- An Introduction

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Rice husk and paddy straw is a lingo-cellulosic material. Mainly composed of combinations of cellulose, hemicelluloses, and lignin, along with appreciable amounts of silica and other minor components. Burning of rice husk and paddy straw is socially unacceptable due to extreme levels of pollution including greenhouse gas emissions. Manufacturer Dharam Bricks, Ludhiana, Punjab, India manufacturing these bricks in 3 Rice husk: 7 brick clay ratios. These 30% rice husk brick is of size 228mm×107mm×169mm as per Indian Standard IS2117. The water absorption capacity of these rice husk and paddy straw bricks taken from literature review was around 8% by weight of the brick and compressive strength of these bricks were near to 12.8 MPa after 28 days taken from literature review. SEM, EDX and XRD analysis suggests higher percentages of fusing of quartz results in better silica percentage which results in increased durability of these bricks.

Rice Husk is used in India for production of biogas, filler and binder material in bricks, animal feed etc. However, rice husk and paddy straw may be used in synthesis of SiC for brick and concrete. The hydraulic characteristics of RHA and paddy straw bricks are equally important due to its water absorption capacity. The use of RHA and paddy straw, amended with coco-peat and soil, has potential for ameliorating the hydro-physical environment in RHA and paddy straw brick affecting air–water relations. Rationing of rice husk ash (RHA) and composted biogas sludge (CBS)) amended with different proportions of soil: RHA and paddy straw mixture (0: 75, 25: 50, 50: 25, 75: 0) may be utilized for similar purposes and to improve the brick making time and cost. These mixtures of RHA, paddy straw and ameliorations' must be <50 % (per cent of pot volume) to improve the hydraulic characteristics of bricks. The use of RHA and paddy straw amended with soil: CBS was not suitable as a brick material due to higher relative evaporation rate and higher rate of infiltration. Water retention in terms of maximum water-holding capacity and available water increased with RHA and paddy straw addition, the increase being enormous with 75 % RHA and paddy straw. Infiltration rate of water in the bricks improved with addition of RHA and paddy straw (0–50 %), showing a steep increase (4.25–8.10 $cm.min^{-1}$) at highest (75%) proportion of RHA and paddy straw. Drainage rate was highest in CBS and soil mixtures.

These mixtures may be treated this include grinding the husks in hammer mill grinder, sieving to eliminate fine material, standardization and improvement of biomass adhesion to the soil-cement system and immersion in 5 % concentrated lime solution, for a period of 24 hr. This pre-treatment Favors the minimization of the incompatibility between the vegetal biomass and Portland cement, besides allowing removing extractives that solubilize in the water and inhibit cement hydration. In general, the quality of soil-cement mixtures is evaluated through destructive tests, such as those of simple compression and water absorption. Likewise, quality can be evaluated through non-destructive tests, such as the ultrasonic wave propagation technique. The use of anisotropic resistance to measure the quality of a brick is based on the relationship between the physical stress produced on the brick during the compression test and a mathematical parameter (its anisotropic structure). The higher its value, the better the quality of the material.

Before making brick its granulometry was corrected through the addition of sand, to make it meet the norm (100 % passing through 4.78 mm mesh sieve, 10 to 50 % passing through 0.075-mm-

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mesh sieve, liquid limit ≤ 45 % and plasticity index ≤ 18%). The pre-treatment consisted in the immersion of rice husks and paddy straw in 5 % hydrated lime solution (24 h) and subsequent drying in an oven at 80 ºC (48 h) to minimize the chemical incompatibility between the cement and the husks and straw. In its natural condition, rice husk and paddy straw were characterized as a light material, with bulk density of 0.086 g/cm^3 and uniform granulometry (89 % between the sieves of 2.00- and 1.19-mm mesh). On the other hand, after undergoing the processes of fractionation, sieving and pre-treatment, rice husk and paddy straw bulk density increased to 0.152 g/cm^3. After this RHA and paddy straw with ameliorations' may be used for brick manufacturing.

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