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Research Paper :

Physical and thermal properties of briquettes by piston press and screw press

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ABSTRACT

The present study was undertaken to the test the briquettes. For this study availability of the biomass in Akola area and select the best suitable biomass for briquette making was studied for groundnut residue, sawdust, soybean residue, sole and mass mixing ratio, respectively. Briquettes made from screw press and piston press were tested for their physical and thermal properties in laboratory. The best suitable material for briquette making with the wood chips and wood species. In case of piston press, groundnut residue (19180.2 kJ/kg), sawdust (18204 kJ/kg), groundnut with sawdust (19569.55 kJ/kg) and ground nut residue with soybean residue (18694.67 kJ/kg) gave better CV or similar to the wood chips (20030.01 kJ/kg) and wood species (babool) (20038.38 kJ/kg). Groundnut residue briquette and groundnut with sawdust briquette gave higher density in piston press of nearly 0.53 to 0.663 g/cm^3. In screw press, density of sole and combination briquette gave 0.392 to 0.433 g/cm^3. The result found that groundnut with soybean residue, groundnut residue and groundnut with sawdust has been most suited for briquetting.

Key words : Briquettes, Piston press, Screw press, Physical and thermal properties of briquettes

As the world population increases (along with an increase in consumption and standard of living), so does the demand for chemicals and energy. Energy is considered as the basis for the progress and prosperity of nation and societies. It is also the cornerstone of economic and social development. Biomass has been one of the main energy sources for the mankind ever since the dawn of civilization, although its importance dwindled after the expansion in use of oil and coal in the late 19th century. Biomass is also capable of providing firm energy. Estimates have indicated that 15-50 per cent of the worlds primary energy used could come from biomass by the year 2050. Biomass is of great importance with respect to energy for developing countries, 15 per cent of the world energy consumption and 43 per cent of energy consumption in developing countries are supplied from biomass.

In the very near future charcoal is expected to be big replaced by natural gas in most of the big cities but in most rural areas and small towns the situation of dependence on forests and farm waste may remain unchanged for more few years. In order to combat the negative handling aspects of bulk biomass, densification is often required. If such crop residues are converted in to briquettes they can provide huge and reliable source of feedstock for thermo chemical conversion (Anonymous, 2002). Thomas *et al.* (1998) concluded that more research efforts should be directed towards the effects of individual constituents and their respective properties the effects of raw material constituents both their level and physical chemical properties, may provide more information on briquetting characteristics and briquette quality than the ingredient inclusion level.

METHODOLOGY

The experimental methodology included study of physical and thermal properties of briquettes. Finally select the best suitable material for high density briquettes.

The following are the important properties to be considered for the selection of material for biofuel.

- High calorific value
- Fast growth and high biomass fuel.
- Should not have major alternative use.
- Should have low nutritive value.
- High biomass / ash ratio

Material including groundnut husk, sawdust and soybean straw were collected from University experimental plots, in Akola and their physical and chemical properties were determined. All samples were then ground in hammer mill and sieved to less than 100 microns. The physical and chemical properties of groundnut husk, sawdust, soybean residue were determined in laboratory using standard test procedure. Physical properties of material included determination of moisture content and bulk density, using oven drying method, overall length and diameter of briquette, as per the ASTM standard no. E871. Moisture content of material was measured by oven drying method. The