

12th World Congress on **Biofuels and Bioenergy**
&
13th Global Summit and Expo on **Biomass and Bioenergy**
September 04-06, 2018 | Zurich, Switzerland

Fuel characteristics of binder free briquettes made at room temperature from blends of *Ceiba pentandra* and oil palm mesocarp fibre

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This study assessed the fuel characteristics of briquettes made from sawdust of *C. pentandra* and oil palm mesocarp fibre at room temperature, using low compacting pressure without a binder. Properties of briquettes studied included: stability in diameter and length; relaxed density; compressive strength; impact resistance index; gross calorific value; volatile matter; ash content and elemental composition. These properties were determined using standard laboratory methods. The results showed that for all compacting pressure levels the stability in diameter and length of the briquettes produced decreased with increasing proportion of oil palm mesocarp fibre in the mixing ratio while increase in compacting pressure resulted in increased relaxed density. All the briquettes produced from blends of *C. pentandra* and oil palm mesocarp fibre had compressive strength lower than those produced from pure *C. pentandra*. However, compacting pressures of 40 MPa and 50 MPa produced briquettes with adequate compressive strength irrespective of mixing ratios. Additionally, all the briquettes produced from blends of *C. pentandra* and oil palm mesocarp fibre had adequate impact resistance index ranging from 120%-350% (IRI>100%). At 5% level of significance, the compacting pressure and mixing proportion had significant effect on the stability in length and diameter, relaxed density, compressive strength and impact resistance index of briquettes produced. The gross calorific values of *C. pentandra* and oil palm mesocarp fibre were found to be 20.33 MJ/kg and 19.50 MJ/kg respectively. The low ash, nitrogen, hydrogen and sulphur contents of the biomass materials used for the study makes them eco-friendly. Therefore, binder free briquettes with adequate physical, mechanical and thermal properties could be produced from a blend of *C. pentandra* sawdust and oil palm mesocarp fibre at room temperature using low compacting pressure.

Recent Publications

1. Okai R, Banful E A and Mitchual S J (2016) Dynamics of lumber production from buttressed-stumps of logging residues using a fuel powered horizontal mobile bandsaw machine. Journal of Environmental Science and Engineering doi:10.17265/2162-5298/2016.02.004
2. Mitchual S J, Donkoh M and Bih F (2015) Assessment of safety practices and injuries associated with wood processing in a timber company in Ghana. Open Journal of Safety Science and Technology DOI: 10.4236/ojsst.2015.51002.
3. Mitchual S J, Donkoh M and Bih F (2015) Awareness and willingness to utilize health and safety measures among workers of a timber processing firm in Ghana. Journal of Scientific Research and Reports 6(3):178-188.
4. Mitchual S J (2015) Enhancing the physical properties of briquettes from sawdust of *Piptadenia africana* through combination with *Ceiba pentandra*. British Journal of Applied Science and Technology DOI: 10.9734/BJAST/2015/12315.
5. Mitchual S J, Frimpong-Mensah K and Darkwa N A (2014) Evaluation of fuel properties of six tropical hardwood species for briquettes. Journal of Sustainable Bioenergy Systems 4(1):1-9.

Biography

Stephen J Mitchual an energetic and enthusiastic Wood Technologist who holds MSc and PhD in Wood Science and Technology. I have over the years past conducted extensive research in the area of sawmilling and biomass energy, and have published extensively in international journals. I have also successfully taught causes in Wood Technology and other related discipline at both Undergraduate and Postgraduate levels during my 13 years working experience with the University of Education, Winneba. Currently, I am the Dean of the Faculty of Technical Education. The opportunity to learn new skills and work with new technologies is particularly attractive to me. Finally, I am a dynamic individual with excellent team working and communication skills. I am also able to relate to a wide range of people.

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