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Optimization of the Fabrication Process for Particleboards Made from Oil Palm Fronds Blended with Empty Fruit Bunch Using Response Surface Methodology

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Abstract : The objective of this study was to evaluate the optimum fabrication process variables to produce particleboards from oil palm fronds (OPF) particles and empty fruit bunch fiber (EFB). Response surface methodology was employed to analyse the effect of hot press temperature (150–190°C); press time (3–7 minutes) and EFB blending ratio (0–40%) on particleboards modulus of rupture, modulus of elasticity, internal bonding, water absorption and thickness swelling. A Box-Behnken experimental design was carried out to develop statistical models used for the optimisation of the fabrication process variables. All factors were found to be statistically significant on particleboards properties. The statistical analysis indicated that all models showed significant fit with experimental results. The optimum particleboards properties were obtained at optimal fabrication process condition; press temperature; 186°C, press time; 5.7 min and EFB / OPF ratio; 30.4%. Incorporating of oil palm frond and empty fruit bunch to produce particleboards has improved the particleboards properties. The OPF–EFB particleboards fabricated at optimized conditions have satisfied the ANSI A208.1–1999 specification for general purpose particleboards.

Keywords : empty fruit bunch fiber, oil palm fronds, particleboards, response surface methodology
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