Enhanced properties of single-layer particleboard made from oil palm empty fruit bunch fibre with additional water-soluble additives

ABSTRACT

The efficacy of additional water-soluble additives was studied relative to the physical and mechanical properties of particleboards produced from oil palm empty fruit bunch (OPEFB). Polyethylene glycol, acrylamide, and acrylic resin were selected as water-soluble additives for use in the OPEFB particleboard production process. The effects of the three additives at two different concentrations (2% and 4% of dry OPEFB mass) on the particleboard properties were evaluated. Addition of water-soluble additives increased the performance of the OPEFB particleboard. The additive concentration has a significant effect on the properties of the particleboard. With the increase of additive concentration, the internal bonding and modulus of rupture value increased while the thickness swelling and water absorption decreased. Particleboards with an additional 4% of acrylamide or polyethylene glycol achieved the highest modulus of rupture (22 MPa), highest internal bonding strength (1 N/mm2), and lowest thickness swelling (9%). All the particleboards produced with 4% of water-soluble additive achieved the standard requirements of JIS A 5908:2003 for physical and mechanical properties.

Keyword: Particleboard; Empty fruit bunch; Water-soluble additive; Acrylic resin; Acrylamide; Polyethylene glycol