

## Effects of face to core particle size ratios on properties of particleboard manufactured from Ethiopian highland bamboo - *Yushania alpina*.

### ABSTRACT

A study was conducted to evaluate the effects of face to core proportion of particles on the mechanical and physical properties of oriented particleboard produced from Ethiopian highland bamboo (*Yushania alpina*). Three-layered oriented particleboards were manufactured from 4 face to core particle proportions at 750 kg/m<sup>3</sup> target density. Urea formaldehyde resin (10%) was used as a binder. Strength and dimensional stability performances of all boards were assessed based on ISO standards. The results showed that the Modulus of rupture (MOR) and Modulus of elasticity (MOE) increased by 23 to 34 per cent and 9 to 20 per cent respectively, with an increase of fine particles at face layer from 20 per cent to 25 per cent and 30 per cent. A further increase of the ratio beyond 30 per cent at face layer could not improve MOR and MOE. Decreasing core layer ratios below 50 per cent resulted in the improvement of internal bond (IB) strength. Higher surface screw withdrawal resistances were obtained for boards made with 25 per cent and 30 per cent fine particles at face layers. On the other hand, edge screw withdrawal resistance showed an increasing trend with increase of IB strength. Increase in fine particles proportion from 20 per cent to 25 per cent and to 30 per cent reduced thickness swelling by 11 and 21 per cent, respectively. However, further increase to 40 per cent increased the thickness swelling significantly. According to the results, bamboo boards made with the ratio efface to core particle being 30:40:30 have highly improved properties than others. Generally, *Y. alpina* culms are suitable raw material for the production of high performance regular purpose particleboards.

**Keyword:** Propotion; Strength; Internal bond; Screw withdrawal; Thickness swelling; Ethiopian highland bamboo (*Yushania alpina*).