Poster presentation

STARTING BEHAVIOUR OF A SMALL WIND TURBINE MANUFACTURED FROM PETIOLE OF THE MIRITI PALM

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In wind turbine blades , core materials such as balsa wood (BW) are used not only to fill the internal space between laminated skins in small blades, but also in sandwich structures and spars, which makes large blades lighter and improves their buckling resistance. This work introduces the petiole of the miriti palm (PMP) as a promising alternative material to BW for these applications, based on its performance in a small wind turbine. PMP is abundant in the Amazon region, and its harvesting is sustainable because the petiole regrows after being cut, leaving the palm tree unharmed. PMP is, on average, less dense than other commonly core materials, including expanded polystyrene and BW. For small wind turbines, starting performance is crucial and the mechanical properties of the core are much less important than its density which must be low to reduce the moment of inertia. High inertia increases both the starting time of the turbine and the gyroscopic loads on the blades. To understand the influence of the material used and the number of blades in a small turbine on starting behaviour, tests in a wind tunnel compared to Blade Element Momentum Theory (BEMT) model are done. The influence of the combination of 2, 3, 4 and 6 blades in terms of starting are assessed. Also, performance coefficients, such as thrust, torque and kinetic energy ratio of the turbine are evaluated.

Key-words: Sustainable development, *Mauritia flexuosa*, wind generators, wind tunnel testing