ANALYSIS OF CALCUTTA BAMBOO FOR STRUCTURAL COMPOSITE MATERIALS

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(ABSTRACT)

Land use issues have dramatically changed the timber supply outlook for our nation's forest products industry. Since demand for wood products shows no sign of abating, alternative products must be developed. Bamboo is a very promising alternative raw material for the manufacture of structural composite products. It is fast growing, economical, renewable and abundant throughout the world. Bamboo has physical and mechanical properties that are comparable to many commercial timber species, and thus, may easily be processed using existing technology from the wood-based composites industry. Bamboo can be cultivated in the U.S., and thus has the potential to relieve some of the harvesting pressure from our nation's forestlands. However, the use of specific bamboo species for structural composite products will require a thorough investigation of the material as well as its interaction with other components. Thus, the primary objective of this dissertation is to determine the properties of Calcutta bamboo and its interaction with adhesives. The properties investigated were relative density, dimensional stability, equilibrium moisture content, bending strength and stiffness, tensile strength, pH, buffer capacity, wettability and the adhesive penetration. In addition to this, a prototype bamboo parallel strip lumber (BPSL) was manufactured and tested for its physical and mechanical properties. The relationships among the properties of Calcutta bamboo and the prototype bamboo composite were also investigated. As the result of these investigations, it is

concluded that Calcutta bamboo is technically a suitable raw material for structural composite products. This result may also be applicable for the utilization of other bamboo species, thus aiding companies in decisions regarding investment in bamboo plantations and manufacturing facilities in the U.S, Malaysia and other parts of the world. The primary benefits from this research may be the development of new products to serve growing markets, and thereby relieving some of the pressure to harvest forestlands