



## GROWTH PERFORMANCE AND CULM BIOMASS PRODUCTION POTENTIAL OF COMMERCIALY IMPORTANT BAMBOO SPECIES IN NORTH EAST INDIA FOR BIO-ENERGY PLANTATION

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**ABSTRACT:** Bamboo is considered as one of the most suitable renewable source for green bio-fuel production owing to its fast growth, ease of cultivation and desirable fuel characteristics. With the increasing demand for utilization of bamboo in bio-energy production, investment in bamboo plantation is expected to increase greatly in near future. Therefore, information on biomass production potential of different bamboo species is vital to secure the sustainable bio-energy production. A field experiment was conducted to assess the growth performance and biomass production of four economically important bamboo species viz. *Bambusa tulda*, *B. balcooa*, *B. nutans* and *Dendrocalamus hamiltonii* at Rain Forest Research Institute (RFRI), Jorhat. The result showed highest culms/clump biomass in *D. hamiltonii* (287.64 kg) followed by *B. balcooa* (198.60 kg). The fresh and dry weight of culm was significantly higher (29.62 kg and 17.92 kg, respectively) in *B. balcooa* compared to other species. However, total biomass per culm was recorded maximum in *D. hamiltonii* owing to higher number of shoot production. The results suggest that cultivation of *D. hamiltonii* can be more profitable for bio-fuel production.

**Keywords:** *Bamboo*, *bio-energy*, *bio-fuel*, *biomass*, *B. balcooa*, *D. hamiltonii*

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### INTRODUCTION

Northeast India is endowed with rich bamboo biodiversity and harbors 33.46% of bamboo growing stock of India (FSI, 2019). Bamboo in Northeast India is traditionally used for house construction, fencing, making handicraft and shoots for edible purposes (Tewari, 1992). With the advancement of modern technology in recent years, utilization of bamboo has expanded beyond the traditional uses. It is also viewed as the most suitable renewable source for green bio-fuel production owing to its higher productivity, regular emergence of new shoots and desirable fuel characteristics (Daza Montaña *et al.*, 2021; Pavlenko *et al.*, 2019; and Sharma *et al.*, 2018). It produces high level of biomass compared to other bio-fuel plants. Productivity of bamboo ranges from 10–40 T/ha/year and the biomass density varies from 300–900 kg/m<sup>3</sup>, which are important characteristics for economic

conversion of biomass to bioenergy (Daza Montaña *et al.*, 2021).

Bamboo biomass can be biochemically and thermo-chemically converted to solid, liquid and gaseous fuels. In comparison to herbaceous crop, fuel properties of bamboo are superior and are almost similar to those of woody plant (Sharma *et al.*, 2018). The added benefit of bamboo over woody plant is that it can be harvested annually once the plantation is established. Bamboo feedstock can be converted into solid fuel (Charcoal and pellets), liquid fuel (Bio-ethanol) and gaseous fuel (gasification for power generation and biogas) (Daza Montaña *et al.*, 2021). Countries like China, Indonesia and Ethiopia are producing charcoal from bamboo on commercial scale (Roliadi and Pari, 2006; Xiong *et al.*, 2014; and Zhang T *et al.*, 2018). In India, in a joint venture between Assam Bio refinery Pvt. Ltd. and two Finnish companies –