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Taxonomical and Ethanobotanical Studies of *Bambusa tulda* Roxb. in New Forest Dehradun

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Abstract
Bamboos are generally tall, erect and woody arborescent grasses. They are mainly distributed in the tropical and subtropical regions of the world. Bamboo grows three times faster than most other plants species. *Bambusa tulda* belongs to Poaceae family and the subfamily Bambusoideae. *Bambusa tulda* also known as Indian timber bamboo is an evergreen in nature. Its shoots contain high nutritional contentsand polyphenols which show medicinal properties to cure cardiovascular diseases and some types of cancer High demand for edible bamboo shoots of *Bambusa tulda* in many Asian ethnic groups has led to the need for developing intensive bamboo farming. The present studies based on survey done at New Forest, Forest Research Institute (FRI), Dehradun (Uttarakhand) India, the minimum leaf size (L×B) of *Bambusa tulda* is 19 x 2and maximum leaf size 21 x 2.Clum height of *B. tulda*is (LxB)~ 15-20 and height of clum sheath(LxB) is 30 x 30.

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INTRODUCTION

Bamboos are the members of the natural group of family Poaceae, the grasses, under the subfamily Bambusoideae. They are mainly distributed in the tropical and subtropical regions of the world. Bamboos are generally tall, erect and woody arborescent grasses (Yeasmin, et al., 2015). Although, bamboos are considered as giant members of the grass family, certain bambusoid characters set them off from other grasses (Mc Clure, 1966). Bamboos are considered as the most primitive members of the grass family (Holttum, 1958). Highly demand rise in Asian countries of bamboo purpose for handcrafting, industries, construction paper making and human consumption and healthcare product, (Sharma et al., 2011; Waikhom and Louis, 2014, Scurlock, et al., 2000, Bal, et al., 2012, Singh et al;. 2020a). Edible bamboos have been identified based on how much content present and beneficial for health because it shoots contain amino acids which are nutritive when they boil and cooked (Waikhom and Louis, 2014, Singh, et al;. 2019) *Bambusa tulda* is symbodial in nature and grow in humid and subtropical region of India. *Bambusa tulda* distrusted naturally in North and North-Eastern parts of country. *Bambusa tulda* also known as Indian timber bamboo is an

evergreen gregarious bamboo with grey or greyish-green culms that is native to the Indian subcontinent (Saxena, 1990). *Bambusa tulda* rich in phytosteriod which contain in succulent shoots and these shoots help in production of steroid drugs (Srivastava, 1990). According to Arvind et al, 2014 the highest fiber length of *Bambusa tulda* is high then *Bambusa arundacea, Dendroclamus hamiltoni. Bamusa tulda'* shoots useful and highly naturational value. Fermented shoot of*B. Tulda* market value in India 40 rupees (≈US $0.66) to Rs. 50 (≈US $0.83) per kg. Fried and caned packe B. tulda is US $1.20. (Singh, et al., 2010). *B. tulda* and *M. baccifera* are sympodial species which produce nutritive shoots (Lin, et al., 2007). *Bambusa tulda* used as building material, scaffolding and roofing, mats and baskets, paper making, tender shoots as food etc. Young culm of some bamboo species like *D. strictus* (bon bans) *B. balcooa, B. tulda, B.bambos*, etc. are used for the edible purpose (Nirala et al., 2017). In India it is found in the state of Assam, Bihar, Meghalaya, Mizoram, Nagaland and Tripura cultivated in Arunachal Pradesh, Uttar Pradesh, Karnataka and Bengal. The species is extensively grown in low hills of central Assam. The species is also occurs in Bangladesh, Myanmar and Thailand. It is one of the major species of Bangladesh. A category of phytochemicals, phenolic acids are major role play in health and provide to potential against diseases. Polyphenols present in *Bambusa tulda* product and they have positive effect and activity which play a vital role in human health issue like as cardiovascular and many types of cancer diseases (Oboh 2008, Singh, et al;. 2020b). *Bambusa tulda* contained nutritional value in which protein, carbohydrates, vitamins, fibers and essential minerals which are observed by many authors in a systematic and analyzed that, they are beneficial component preset that species (Anonymous 2004; Bhatt et al. 2005a; Nirmala et al. 2008). *Bambusa tulda* shoots contain considerable amount of potassium, carbohydrates, ascorbic acid, riboflavin, thiamine, niacin, phenolic acids and fibres but a less content of fat in these species (Tripathi 1998; Park& John, 2009).

MATERIALS AND METHOD

Present study of diversity and distribution of *Bambusa tulda* (Family Poaceae, Subfamily Bambusoideae) based on survey done at New Forest, Forest Research Institute (FRI), Dehradun (Uttarakhand) India. Vegetation is deciduous and evergreen spread over more than 1100 acre area situated between N30º 20′31.56″ Latitude and Longitude E77º 59′50.28″. The climate is hot summer, well distributed rainfall (360mm) during South-West monsoons and cold winter with less winter rain. During study overall campus and basis of survey viz. Bambusetum, Botanical garden, Beeson Road, Canning Road, Chaturvedi Road, Circular Road, Parker Road, Takle Road, Hospital Road, Howard Road, Tierman Road, Lace Road, Teak Road, Trevor Road, Troup Road, Shalich Road and Rao Road *Bambusa tulda* species found inwhole campus. A taxonomic significance along the socio-economic and ethnomedicinal importance tabulated. *Bambusa tulda* was identified through relevant key literature and herbarium specimens housed in Systematic Botany Discipline, Forest Research Institute (FRI), Dehradun (Uttarakhand) India.

RESULTS

Bambusa tulda Roxburgh, Fl. Ind., ed 1832.2: 193.1832., known with vernacular names-Wamunna, Wagi, Nal-bans, Tulda and Jowa. The species is evergreen or deciduous, tufted, gregarious bamboo. Culms usually 7-23 m high and 5-10 cm in diameter, glabrous , green when young, grey–green on maturity, ,nodes slightly thickened, lower ones have fibrous roots; internodes 48-50 cm long, white ring below the node, thin walled, Culm sheath 25-30 cm broad and 30 cm long, attenuate upwards and round or truncate at top adaxial surface smooth with whitish powder, abaxial surface, sometime covered with brown hairs; blade broadly triangular, cordate, erect, hairy within; ligule continuous with the blade and rounded with ciliate margin. Leaves 21 -25 cm long and 2-4 cm broad, linear lanceolate or lancelate, upper surface dark green, shiny, smooth, lower surface dull, apex acuminate, petiole 1-2 mm long, hairy. Inflorescence variable, sometime an immense radical leafless panicle, sometime a short leafy paniculate or spicate, bearing interrupted clusters of few (1-5) usually fertile long spike-lets supported by shining chaffy bracts; rachis smooth, striate, spike-lets variable in length from 2.5-7.5 cm long, 5mm broad, sessile, glabrous; cylindrical and acute at first 1-2 short bracts, then 2-4 usually gemmiparous empty glumes, 4-6

fertile flowers, and 1or 2 imperfect or male terminal flowers ; empty glumes acute, many – nerved; flowering glumes many – nerved, glabrous, striate 1.2-2.5 cm long and 7.5 mm broad, ovate acute or acuminate, mucronate, sometimes minutely ciliate on the edges; palea rather shorter, boat shaped, 2-keeled, with long white cilia on the keels and penicillate at the tip and occasionally the faintly ciliate edges, auriculate below the glumes so that spikelets readily breaks up; lodicules 3, 2.5 mm long, 2 cuneate oblong, obliquely truncate, thickened and fleshy below, especially on one side. Ovary obovate-oblong, white, hairy above, surmounted by a short hairy style Caryopsis 7.5 mm long oblong.

Figure 1: *B. tulda*; 1. Culm; 2. Starting Point; 3-4. Culm Sheath; 5. Leaves; 6. Internodes; 7. Branching

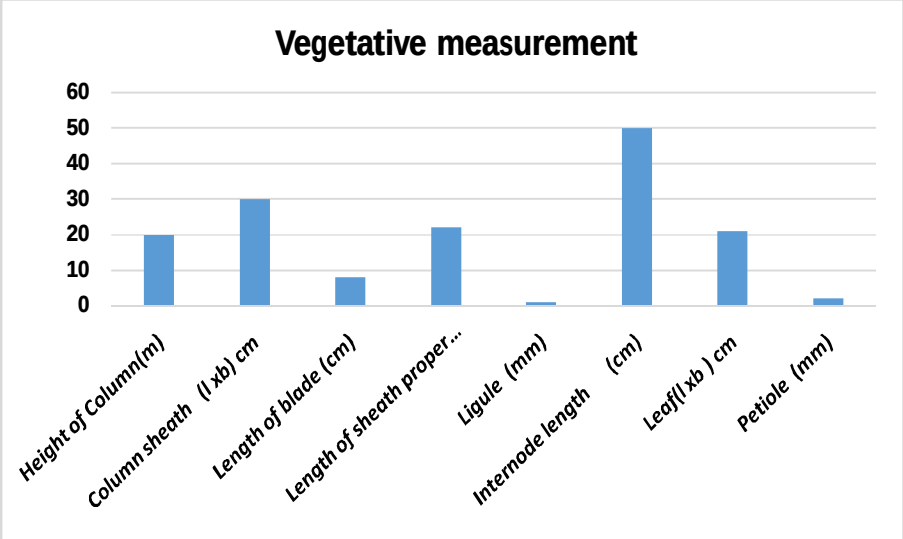

Figure 2: Vegetative measurement of *Bambusa tulda*

DISSUCSION

The result on the basis of literature as well as taxonomical attribute including, clum sheath, leaves, internode length, liguleand upper as well as lower auricles (Wang & Li, 2019; Kumar, et al;. 2021a). *Bambusa tulda* has been used for multipurpose most useful species in bamboo genus (Sahariah, et al., 2014). *Bambusa tulda* is widely used in paper pulp industry in Asia (Larpkern et al., 2011). In Asian ethnic groups *Bambusa tulda* shoots highly demandable because of its edible shoots are highly nutritive in nature (Waikhom, & Louis, 2014). Medicinal uses of the leaves of *Bambusa tulda* have not yet been widely studied, and the effects of *Bambusa tulda* leaf extract on stem cells remain to be thoroughly assessed(Lee, et al., 2017) Background and aims of flowering incidence *Bambusa tulda* has high socioeconomic impact. The purpose of study to showed and describes the morphological characters (Vegatative and reproductive). *Bambusa tulda* gregarious in nature due to its flowering and we noticed that its gregarious flowering recorded couple of year back (Kumar, et al;. 2021b, Bennet, 1990).

CONCLUSION

The result based on the survey carried out at New Forest, Forest Research Institute (FRI), Dehradun (Uttarakhand) India. During study it has been found that the bamboosetum of FRI is a rich source of Bamboo sp. Schreber. There were 17 species observed all over *B. tulda* have socioeconomic values viz. gardening, road side plantation, paper and rayon manufacturing, house constructions, handicrafts, food and medicines. Present study discussed the result on the basis of morphological and anatomical attributes viz. height of plants culm sheath, blade length, ligule length, presence or absence of auricle, petiole length, inter-nodal length and leaf dimensions of all *B. tulda* species in FRI campus. *B. tulda* can play a significant role in the medicine as well as environmental role.

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