RP Current Trends In Agriculture And Environmental Sciences
Vol. 3, No. 4 (October – December 2024) pp. 46–51
e-ISSN: 2583-6293

RESEARCH PLATEAU PUBLISHERS

Cite this article: Arvind Kumar, Examining the bamboo species of district Bilaspur of Himachal Pradesh, India, *RP Cur. Tr. Agri. Env. Sci.* **3** (2024) 46–51.

Original Research Article

Examining the bamboo species of district Bilaspur of Himachal Pradesh, India

Arvind Kumar*
Department of Botany, Government Post Graduate Nehru College, Jhajjar – 124103, Haryana, India
*Corresponding author, E-mail: botany.arvind@gmail.com

ARTICLE HISTORY
Received: 2 July 2024
Revised: 7 October 2024
Accepted: 8 October 2024
Published online: 12 October 2024

KEYWORDS
Bamboos; Bambusaceae; Culm; Western Himalaya; Shivalik Hills; Satluj (River).

ABSTRACT
Bamboos are woody, perennial grasses that are members of the Bambusaceae family. These are the plants that grow in clumps and emerge from the rhizomes underground. There are separate internodes and nodes on the stem (culm). The world's fastest-growing plants are bamboos. India's Western Himalayan area is home to Himachal Pradesh. The Shivalik Hills, sometimes referred to as the Outer Himalayas or Sub-Himalayan region of Himachal Pradesh, are home to the district of Bilaspur. Shivalik Hills' environment is ideal for growing a variety of bamboo varieties. There are six species of bamboo known to exist in the Bilaspur area: *Dendrocalamus hamiltonii, Dendrocalamus parishii, Dendrocalamus strictus, Bambusa bambos, Bambusa nutans*, and *Bambusa vulgaris*. This paper's objective is to identify the bamboo species found in District Bilaspur of Himachal Pradesh, India.

1. Introduction

Bilaspur, with an area of 1167 square kilometers, is the second-smallest district in Himachal Pradesh. Additionally, it is one of the twelve districts that make up India's Himachal Pradesh (Figure 1). Bilaspur's elevation ranges from 290 to 1980 meters. It is bordered to the north by the districts of Hamirpur and Mandi, to the east by Mandi and Solan, to the south by Punjab State and Solan district, and to the west by Una and Hamirpur districts (Figure 2). About 90 kilometers of the Satluj River pass through the Bilaspur district. This river enters the district of Bilaspur at "Karahi ka Gharaat," next to the hamlet of Kasol, which is now well-known for its 800 MW Koldam Hydropower Station. It exits at the village of Neila, close to the Bhakhra Dam, where the Bhakhra Dam Hydropower Station has a 1325 MW total capacity [1].

This paper's primary goal is to identify the different species of bamboo found in the district Bilaspur of Himachal Pradesh. This study also includes information on their systematics, common names, vernacular names, citations, morphological characteristics, flowering and fruiting seasons, collection locations, habitat, distribution in the world, India, and Himachal Pradesh, as well as economic and ethnobotanical uses.

During the field survey, colored photos of these species are captured. The district of Bilaspur's Sadar, Ghumarwin, Bharari, and Jhandutta Forest Ranges are home to a large number of bamboo species. They are less common in the Kalol and Swarghat Forest Ranges. Because bamboos have so many benefits, this report will encourage people to conserve them.

2. Materials and methods

To investigate the various bamboo species, a thorough field investigation of the district Bilaspur has been conducted. To harvest, preserve, and identify different species of bamboos, standard procedures are used. Their floral and vegetative traits are recorded throughout the field survey. In the field, colored photos of every species are also taken. These species are also made as herbarium mounts for identification and documentation. We closely followed the terminology employed by other researchers when characterizing and classifying the numerous species of bamboos [2–6]. Their names follow the International Plant Names Index (IPNI) or the Melbourne Code, often known as the International Code of Nomenclature (ICN) [7-9]. This paper follows the Natural System of Classification of Plants with the Newest Amendments.

3. Observations

A survey of the district Bilaspur's bamboo diversity has been conducted throughout the year to better understand its uniqueness. In all, six species from two genera that are all members of the same family—the Bambusaceae—have been documented from Bilaspur. The Sadar, Ghumarwin, Bharari, and Jhandutta Forest Ranges are home to a large number of bamboo species. However, the Swarghat and Kalol Forest Ranges have fewer bamboo species. There have been reports of Bambusa vulgaris from ACC Limited's nursery garden in Barmana.

Figure 1: Map of Himachal Pradesh.

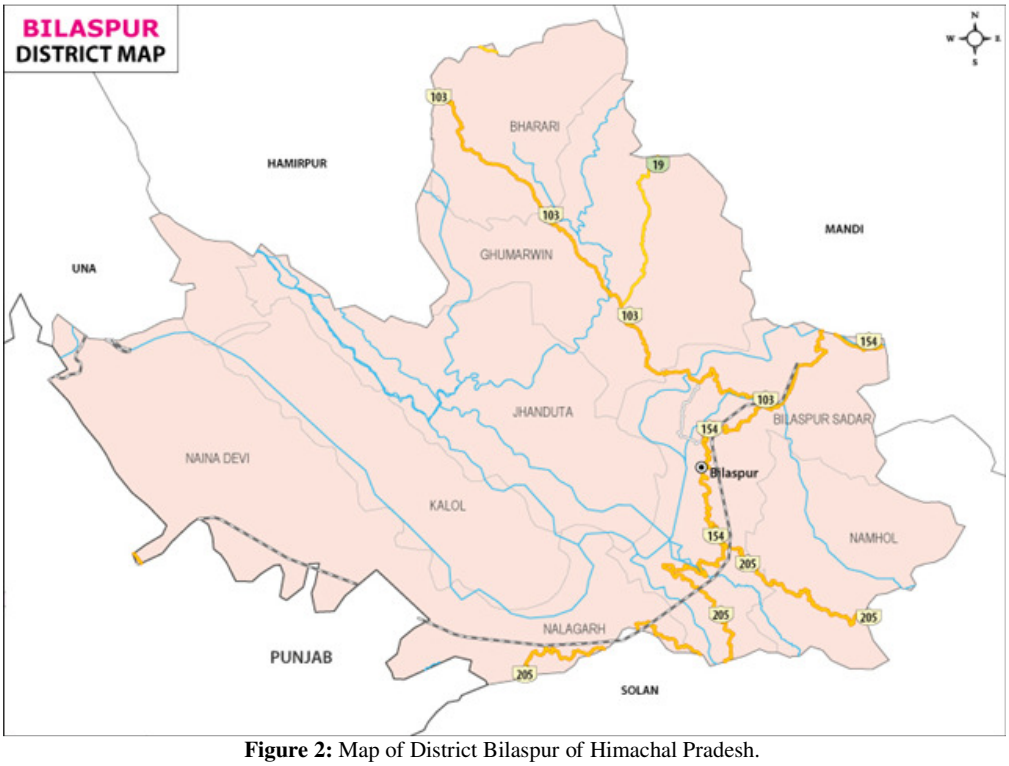

Figure 2: Map of District Bilaspur of Himachal Pradesh.

4. Results and discussion

During the field survey in the district Bilaspur of Himachal Pradesh, six species of bamboo — *Bambusa bambos, Bambusa nutans, Bambusa vulgaris, Dendrocalamus hamiltonii, Dendrocalamus parishii*, and *Dendrocalamus strictus* — are gathered and identified. The following is an alphabetical description of the different species of bamboos:

1. *Bambusa bambos (L.):* This tall, prickly bamboo has dense culms that grow from robust, branching rootstocks. Clump is curved and elegant. Culms up to 45 cm long, slightly recessed near the base of the branches, 2.5-5 cm thick wall; nodes prominent, lowest nodes rooting, lower nodes with leafless, spinescent, zigzag horizontal branches; bright green shining, 20-30 m tall, 15-18 cm in diameter; cavity small (Figure 3).

Culm-sheaths: 30-38 × 22-30 cm, striate, orange-yellow, thickly ciliated with golden hairs when young, otherwise glabrous, rounded at the apex; blade of 5-10 cm length, triangular, acuminate, glabrous on the outside, matted with dark bristles inside, margins wavy, involute, thickly ciliate, auriculate; ligules are narrow, whole, or fringed with pale hairs.

Leaves: The leaves are 18–20 cm long, linear or linear-lanceolate, glabrous above, glabrous or puberulous below, with scabrous margins, a sharp, stiff tip, a rounded or oblique base, and ciliation near the petiole. There are 4-6 secondary longitudinal nerves on either side of the midrib, with pellucid glands at intervals; the petiole is 2.5 mm long and swollen; the leaf sheath has short auricles, thickly ciliate when young, small ligules.

Figure 3: Bambusa bambos (L.) species.

The entire culm is occupied by the massive panicle that constitutes the inflorescence. Glabrous, 1.3–2.5 cm long spikelets on branchlets, approximately 5 in a cluster, lanceolate, and sharp; bottom flowers are bisexual, upper flowers are male, and 1-3 imperfect blooms follow. Involucral glumes 5-8 mm long, many-nerved, empty, ovate-lanceolate, acute or mucronate, 1-2 or occasionally missing. Glumes of flowers are 3–7. Palea has two ciliate keels and is sub-acute. There are three oval or sub-ovate, hyaline, ciliate, 1-, and 3-nerved ducticules. The anthers are yellow and obtuse, while the stamens are thin and drooping. Style is brief. The rectangular, 5-8 mm long grains terminate in a short beak that is shaped by the style's base and grooved on one side.

Fruiting and Flowering: Bloom sporadically every 30 to 32 years.

Specimens Examined: Chandpur, 15 July, 2024.

Distribution: South India, Sri Lanka, and Myanmar. India: Himachal Pradesh, Uttarakhand, and the Sub-Himalayan region. Himachal Pradesh: Bilaspur (elevation: up to 1200 meters).

Economic and Ethnobotanical Uses: Burn the root to treat joint discomfort, bleeding gums, and ringworm. It is also a tonic. Roots help with general debility, strangury, burning feelings, and skin conditions. Acrid, bitter, and sour, the stem and leaves have cooling and laxative properties. They can be used to treat burns, blood disorders, biliousness, leucoderma, inflammations, strangury, wounds, and piles.

Young shoots can be eaten and pickled, and the stem is used to make paper pulp, rafters, poles, mats, and household goods. Bamboo manna, also known as Banslochan or Tabashir, is a crystalline, silicious material that is found inside stems. Pregnant women and children are advised to take it because it is high in calcium; it is sweet, cooling, acrid, and flavorful; it is aphrodisiac, tonic, and constipating; it is beneficial for blood disorders, TB, bronchitis, fever, leprosy, jaundice, anemia, strangury, burning sensations, biliousness, thirst, ophthalmia, and stomatitis; the burnt powder is helpful for syphilis. For lumbago, hemorrhoids, diarrhea, gonorrhea, amenorrhea, dysmenorrhea, wounds, skin conditions, and fever, the leaves are pleasant, astringent, cooling, emmenagogue, ophthalmic, vulnerary, constipating, and febrifuge.

Additionally, leaves are used as feed. Sprouts are laxative, acrid, and pungent; they are helpful for strangury, but they also make you cough more and give you a burning feeling. In times of need, seeds are consumed because they are aphrodisiac, sweet, fattening, acrid, and alexiteric. They are also helpful for biliousness and urine discharges. Flower juice helps with deafness and earaches [10–12].

2. *Bambusa nutans*: Growing from a creeping rhizome, the culms are 6–17 m long, 3–8 cm in diameter, straight, graceful, and free of thorny branches. When young, they are bright green and glaucous, with hairy, little-raised nodes and internodes that are 37–45 cm long, thick-walled, and dull-looking. Culm sheaths are 15–23 cm long, rounded at the top, and contain black hairs adpressed on the back. Once the hairs fall out, the sheaths become scabrid.

The blade is broad, sharp, has recurved borders, is decurrent on the sheath, has two big, wavy, densely bristly auricles, and is black-hairy inside.

The ligule is narrow and dentate. The petiole is 2.5 mm long, striate, and produces a falcate auricle with long bristles. The leaves are 10-30 × 1.8-4 cm, scabrid at the top along the midrib and margins, tip twisted, base rounded or constricted. There are also 7-10 secondary longitudinal nerves on either side of the midrib. A stiff panicle of spike-like braches with broken clusters of spikelets is called an inflorescence (Figure 4).

Figure 4: Bambusa nutans species.

Figure 5: Bambusa vulgaris species.

Axis (rachillum) clavate; lodicules 3 fimbriate; spikelets 1.8-2.5 cm long, glabrous, acute, empty glumes 2-3, fertile flowers 3-5, followed by 2-3 imperfect blooms. They have apiculate anthers. Twisted stigmas two and three. The top grain is oblong and hairy.

Fruit and Flowering: August–October (sometimes).

Specimens Examined: Sungal, October 25, 2024.

Distribution: The Sub-Himalayan tract is the distribution. India: Assam to Jammu Kangra, Himachal Pradesh (DD). Elevation: up to 1700 meters.

Economic and Ethnobotanical Uses: Leaves are fed. Strong and straight, culms are used to make mechanical pulp. They are employed as shafts and rafters in construction.

3. *Bambusa vulgaris*: Although it is a huge, attractive bamboo with tufts, the clumps are not dense. Unarmed, bright-yellow culms with narrow green stripes along the internodes and on opposite sides in neighboring internodes, 6–17 m high, internodes 25.4–45.2 cm long and 7.6–12.7 cm in diameter, thin walls; culm sheaths 15–25 cm, brownish hairy outside; green and yellow streaked at younger stage, top concavely truncate, blade triangular and auricled at base (Figure 5). Leaves: 30-41 × 2.5-5 cm; nerves: 21-39; bottom surface: transverse veins; appressed white hairy leaf sheath. Spikelets are thin and compacted. It's long and hairy. The three stigmas are plumose. Uncertain of its native home, it is grown in gardens and spreads wild throughout the country's warmer regions.

Specimens Examined: Barmana, June 25, 2024.

Economic and Ethnobotanical Uses: Bamboo is utilized for roofing, scaffolding, and other purposes. Culms have a variety of uses, including construction. Split culms are used to make paper as well as mats and baskets. Young buds are eaten like vegetables. The leaves are cooling, and their infusion helps with sore throats and fevers. Culm is a useful source of paper pulp since it is soft and long-fibered.

4. *Dendrocalamus hamiltonii*: Its leaves are wider than those of *Dendrocalamus strictus*, and the purple spikelets' globose heads lack spines. With overhanging, frequently horizontal branches, this bamboo grows into impenetrable thickets of stems (culms) up to 26 meters in height. Culm stems are dull-green, 10–13 cm in diameter, with lower nodes adorned with root scars and internodes that are 30–50 cm long. The stem sheaths are triangular, persistent, and can reach a length of 30 cm. Branches on the lower portion of the stem may have half-developed, bulging buds with brown sheaths on woody knobs the size of a fist.

The leaves are long-pointed, narrow-lanceolate, cuspidate, and up to 45 cm long by 13 cm wide. They are smooth on the outside and rough on the inside, with six to seventeen pairs of main lateral nerves and an uneven base.

The petiole is short, and the ligule is broad. Stiff-haired leaf sheaths. On robust, unbranched stems, spikelets are blunt and arranged in dense, spherical axillary clusters that are 1.5–4 cm across. Ciliated edges are present on bracts. There are six stamens. The grain is beaked and generally ovoid (Figure 6).

Fruiting and Flowering: Infrequently.

Specimens Examined: Bharari, April 4, 2024.

Habitat: Wild or Cultivated.

Distribution: Nepal, Southeast Asia, India, Burma, and the Tropical Himalaya. India: E. Himalaya, Assam, Himachal Pradesh to Arunachal Pradesh. Himachal Pradesh: Kangra (DD) and Hamirpur (DD).

Altitude: 2,000 meters or more.

Economic and Ethnobotanical Uses: Used to make paper. In Assam, Bhutan, and Sikkim, young culms are produced as vegetables. The huge lumen and lengthy internodes of this bamboo make it ideal for water conduits. Screens, carpets, and baskets are also made with it. For use as shafts, rafters, and other building components, stems are rather soft.

Figure 6: Dendrocalamus hamiltonii species.

5. ***Dendrocalamus parishii***: A caespitose and perennial bamboo, it has woody, upright culms with terete internodes. Dendroid lateral branches. The inflorescence is bractiferous, globose, dense, clustered at the nodes, and 1.5-3 cm long. The bracts are glumaceous and extend 6-10 mm. The buds are axillary at the base of the spikelets, prophyllate beneath the lateral spikelets, and there are no leaves in between clusters. Lower glumes are 4 mm long, ovate, acute, coriaceous, without keels, puberulous with hairy apex and ciliate edges. Glumes 1 and 2 are empty, similar, persistent, and shorter than spikelets. The flowers Fertile lemma, oval, chartaceous, keelless, 6 mm long, with lateral veins that are crossveined, ciliate edges, an acute apex, and a mucronate. Fruits are caryopsis, ovovoid, and the ovary is hairy (Figure 7).

Figure 7: Dendrocalamus parishii species.

Flowering and Fruiting: March to June.

Specimens Examined: Mihare, 24 April, 2024.

Habitat: Common in forest and waste land.

Distribution: Native to Kerala.

Economic and Ethnobotanical Uses: In regions where wild animals are a problem, bamboo is utilized as a biofence around the fields. Calcium from mature culms is abundant and used in the pharmaceutical industry.

6. ***Dendrocalamus strictus***: The densely packed clumps of erect, arborescent bamboo range in height from 7 to 14 meters. The rootstock had many branches. Greyish-green, frequently blotched, 5-8 cm in diameter, spinescent, internodes 10-25 cm long, swelling nodes branching at nodes, and rooted at the joints close to the base, culms can occasionally be solid or have only a small cavity (fistular). Branches might be horizontal, curved downward, rigid, spreading, or crowded. Stem sheaths strong, shiny, papery, highly deciduous on swelling joints; little shorter than the internodes, 7-30 cm long, thinned upwards to a rounded tip; blade triangular, hairless or with greyish- brown hairs; ligule short, narrow. Narrow, membranous, ± 1 mm long, toothed ligules; sheaths hairy, mouth bristly; leaves 10-20 × 2-3 cm, linear-lanceolate, not net-veined, finely pointed, base constricted, sub-cordate or rounded, upper surface rough, bottom gently hairy. Spikelets are terete, spinulose, 0.6-1.2 cm (little sterile and fertile ones are intermingled), 2-3 flowered, and packed in big, globose (2.5 cm wide) sessile heads that are spaced periodically along the branches of a lengthy panicle. Bracts have a characteristic spiky tip and are hairy. The keel extends into a sharp spine, and the lemma is ± 1 cm long. Paleas truncate, 2-keeled, 0.8-1 cm long. Six far-protruding stamens with apiculate anthers. There are no lodicules.

Hairy ovary; single or branched, thread-like, very long, and close to the feathery tip. The persistent style-base is beaked, ovoid, hairy, and contains free grains inside the persistent glumes (Figure 8).

Figure 8: Dendrocalamus strictus species.

Flowering and Fruiting: Occasionally or from November to January. Although it flowers sporadically across a number of years, a clump may occasionally be seen blooming in the cold season of practically any year.

Specimens Examined: Amarpur, 18 June, 2024.

Habitat: Very common around villages in lower dry hills.

Distribution: Pakistan, Nepal, India to Myanmar, Singapore, Java, India, Shivalik Hills, Himachal Pradesh: Bilaspur, Mandi (BSD), Sirmaur (Paonta Sahib, Renuka), Kunihar, Nurpur and Una.

Altitude: 400-1500 m.

Economic and Ethnobotanical Uses: Highly prized stems for construction, they are also used for paper pulp, swings, water pipes, fishing rods, masts for country boats, lance shafts, rafters, battens, scaffoldings, mats, baskets, sticks, furniture, tent poles, bamboo bridges, and musical instruments. Pulp is appropriate for the rayon business as well. Bamboo has been used to make activated carbon, which is useful for metalsmithing. In addition to being fed as fodder, leaves are also given to animals during parturition to help the placenta be expelled quickly.

References

[1] S.P. Ambasta, The useful plants of India, Publication and Information Directorate, CSIR, New Delhi (1986).

[2] H.G. Champion, S.K. Seth, A Regional Survey of the Forest Types of India, Govt. of India Publication, Delhi (1968).

[3] M.W. Chase, J.L. Reveal, A phylogenetic classification of the land plants to accompany APG III, *Bot. J. Linn. Soc*. **161** (2009) 122-127.

[4] N.S. Chauhan, Medicinal and Aromatic Plants of Himachal Pradesh, Indus Publishing Company, New Delhi, India (1999).

[5] M.C. Das, P. Singnar, A.J. Nath, A.K. Das, Flowering in Bambusa balcooa Roxb. in Barak valley of North East India, *Ind. Forest*. **143** (2017) 180-181.

[6] N.C. Nair, Flora of Bushahr Himalaya, International Bio-Science Publishers, Hisar, Madras (1977).

[7] O. Polunin, A. Stainton, Flowers of the Himalaya, Oxford University Press, Delhi (1984).

[8] T. Pullaiah, Medicinal Plants in India, Regency Publications, New Delhi (2002).

[9] M.K. Seth, Trees and their economic importance, The Bot. Rev. (New York) **69** (2003) 321-376.

[10] R. Sharma, Medicinal Plants of India, An Encyclopedia, Daya Publishing House, New Delhi (2003).

[11] A. Stainton, Flowers of the Himalaya – A supplement, Oxford University Press, Delhi, India (1988).

[12] P.K. Warrier, V.P.K. Nambiar, C. Ramankutty, Indian medicinal plants: A compendium of 500 species, *Orient Blackswan* **3** (1994) 132-135.