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Morphological, Systematics and Ethnobotanical Documentation of Sinarundinaria Wightiana (Nees), a Temperate Bamboo of the Nilgiri Shola Ecosystems, Southern India

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ABSTRACT

The Nilgiris region hosts a variety of indigenous groups such as the Todas, Irulas, Kurumbas, Paniyas, and Badagasand Kattunayakas. *Sinarundinariawightiana* (Nees) C.S. Chao &Renvoize, commonly referred to as "Otmult" and "OdaKuruthu" by the Todas, Kotas, and Badagas, plays a significant role in their traditional practices. The sprouting vegetative shoots, which emerge during the early monsoon season (April–June), are consumed as a seasonal delicacy.This species is also valued for its medicinal applications. Local communities use it to treat ailments such as inflammation, cough, fever, wounds, and ulcers. The young shoot paste is used as a nutritional supplement for cattle, while leaves mixed with fodder are believed to enhance milk yield.Taxonomically, *Sinarundinariawightiana* belongs to the family Poaceae. Bentham and Hooker classified the family under the 7th series, Glumaceae, whereas Rendle placed it after the Triuridales due to its wind-pollinated, perianth-less flowers.The plant is a perennial, erect woody shrub with slender culms emerging from short rhizomes. At maturity, the culms turn yellowish brown and range from 200–300 cm in height. Distinct morphological features include semiterete internodes, swollen nodes, yellow culm sheaths with tawny hairs, and ovate-lanceolate leaves with scabrous margins. The inflorescence is a purplish open panicle with small subtending bracts.This species is widespread in the natural shola forests of Doddabetta, Naduvattam, Mainala, and Pykara in the Nilgiri District, where it forms part of the understory vegetation. This study emphasizes the ethnobotanical and taxonomic significance of *Sinarundinariawightiana* and highlights the importance of conserving this species to protect the biodiversity and traditional knowledge systems of the Nilgiri region.

Keywords: *Sinarundinariawightiana*, Ethnobotany, Taxonomy, Shola forests, Nilgiris, Conservation, Indigenous knowledge, Bamboo

INTRODUCTION

Bamboo is a well-known plant distributed across the world, particularly in Asian and African countries. It holds significant cultural and utilitarian value among Mongoloid communities and in regions where these populations are predominant(Janzen, 1976). In India, bamboo is widely used, with its importance

varying considerably from state to state and region to region. It is especially popular in the Northeastern states, Uttarakhand, and North Bengal—areas predominantly inhabited by Mongoloid communities—while its use is relatively less prevalent in other parts of the country.

India ranks second globally in bamboo production, following China, with an annual outputofapproximately 13.5 million tonnes(Hanke, 1990). The global bamboo trade is estimated to be worth over $10 billion, yet India's contribution remains a modest $100 million. Recognizing its economic and ecological potential, former Prime Minister AtalBihari Vajpayee launched the National Bamboo Mission on June 5, 1999. This initiative gained momentum when the United Nations Development Programme (UNDP) implemented a Cane and Bamboo Technological Upgradation and Networking project in the Northeastern region, where bamboo forms an integral part of the daily life and culture of diverse ethnic groups. Bamboo is a singular resource that supports the basic needs of millions of rural people—providing food, shelter, medicine, and livelihood(Goldberg, 2025).

Botanically, bamboo belongs to the family Poaceae. These plants typically exhibit rapid growth during the monsoon, often growing at a rate of 45 to 50 cm per day.Bamboo comprises around 30 genera and about 550 species. Bamboo stems (culms) are composed of fiber bundles, and the arrangement of these bundles contributes to the hardness of the culms. The outer shell is thick, and the deposition of silica in the cortex further enhances their durability. The culms are jointed at regular intervals(Ballabha, Rawat, Tiwari, Tiwari, & Gairola, 2013).

Bamboo is also recognized for its medicinal properties. Both ancient and contemporary literature affirm its therapeutic potential. Indian scriptures mention bamboo shoots being used both as food and as medicine(John, Nadgauda, & Mascarenhas, 1995). *Susruta* noted that bamboo, when consumed with milk, can act as a poison. It possesses all tastes—sour, bitter, pungent, sweet—except salty. In India, tender bamboo shoots of *Bambusa vulgaris*, *Sinarundinariawightiana*, *Bambusatulda*, *Bambusabalcooa*, *Bambusaarundinacea*, *Dendrocalamushamiltonii*, and *Dendrocalamusstrictus* are commonly eaten

Sinarundinariawightiana is native to It is found in the hills of Southern India and Sri Lanka, particularly prevalent in the Nilgiri Hills, where it grows well on the higher slopes ranging from 1200–1800 meters in elevation, primarily as an undergrowth in evergreen shola forests (notably in Doddabetta, Mainala, Naduvattam, and Pykara)(Indian & Ayurveda, n.d.). The Nilgiri Hills are part of the Western Ghats, with Doddabetta being the highest peak at 8,640 feet above mean sea level.

The Nilgiri District is geographically located between 11°12'N and 11°43'N latitudes and 76°14'E and 77°E longitudes. It serves as a convergence point for three major mountain systems: the Western Ghats (including Doddabetta), the Eastern Ghats, and the Southern Ghats(Malik, 2016). The district hosts a rich variety of vegetation including evergreen forests, montane shola forests, moist and dry deciduous forests with bamboo, montane grasslands, savannah woodlands, and shrub savannahs.

TOPOGRAPHY OF NILGIRIS

The Nilgiri District is divided into four main geographical regions:

1. **The Nilgiris Plateau** – located centrally within the district.
2. **The Sigur Plateau** – situated at the foothills on the northern side of the plateau.
3. **The NilgirisWayanad** – lying to the west of the above two plateaus.
4. **The outer slopes** – facing the adjoining plains.

Rainfall in the district varies significantly, and there has been a noticeable decline in the number of rainy days in recent years. The first three months of the year are almost rainless, with February being the driest

month. The maximum rainfall is typically recorded in September. From December to May, the skies are generally either clear or only partly cloudy. Cloud cover begins to increase in March, and from June to November, the skies are usually heavily overcast.

Although the Nilgiris lies within the tropical zone, it enjoys a subtropical to temperate and equable climate due to its elevation. The region's soils are derived from charnockite rock, forming ferrogenous clay. Common soil types include clay, clay loam, and loam.The soils are strongly acidic, exhibiting pH levels between 4.5 and 6. They are rich in iron and alumina but deficient in essential nutrients like phosphate, nitrogen, and potassium.

Among the different vegetation types, shola forests exhibit the highest soil moisture and temperature levels. Shola soils contain 12% coarse sand, 10.8% fine sand, 10.9% silt, 65.7% clay, and 4.05% organic carbon, measured up to a depth of 15–30 cm. The intense solar radiation, wide range of temperatures—especially in the colder months—and forested terrain all contribute to the region's exceptional floristic diversity

The Nilgiris region is inhabited by various indigenous communities, such as the Todas, Kotas, Irulas, Kurumbas, Paniyas, Kattunayakas, and Badagas.The tender shoots of *Sinarundinariawightiana* (syn. *Arundinariawightiana*Nees) are considered a delicacy among the Todas, Kotas, and Badagas. These edible vegetative shoots sprout from the soil surface and are primarily harvested during the early monsoon season. Ancient texts note that while bamboo shoots are considered difficult to digest and may aggravate conditions like arthritis, *kapha*, and *pitta*, when properly processed, they are digestive, reduce menstrual flow or vaginal discharges, and can be beneficial for strangury and haemoptysis.

Bamboo has traditionally been used in folk medicine to treat both humans and animals. The resinous gum exuded by *Melocannabambusoides*, known as *BangsaLochan*, is regarded as highly medicinal. In Unani medicine, it is called *Tabasheer*, a shiny, brittle substance resembling charcoal. It is believed to treat tuberculosis, coughs, and bronchial conditions and is a key ingredient in *Chyavanprash*, a widely used Ayurvedic tonic.

In traditional veterinary practices, bamboo leaves are fed to cows after calving to ensure smooth delivery. Regular feeding is also thought to increase milk production and regulate the menstrual cycle in cattle. According to Unani texts, bamboo leaf juice mixed with honey cures coughs, and the root, when combined with other herbs, is effective for strangury and oedema. In Tamil folk medicine, bamboo is believed to dilute viscous fluids. A paste made from bamboo root and *Alangiumsalvifolium* root mixed with cow's milk is applied externally as an antidote for dog bites. The ash of bamboo rhizome mixed with sesame oil is applied to bald spots, while the rhizomeCharcoal made from rhizomes is traditionally used as a tooth powder to maintain healthy gums and brighten teeth.

Both fresh and dry bamboo bark also possess medicinal properties. In Manipur, bark is scraped to extract moist powder, used to manage blood sugar. Its smoke is inhaled to relieve asthma symptoms. Not all bamboo species have thorns, but in *Bambusaspinosa*, the thorns are used as poultices for abscesses or infected wounds to facilitate drainage. They are applied not only to the affected area but also to the surrounding skin. (Ghosh, 2008)

This study aims to investigate the taxonomyethnobotany, and phytochemistry of *Sinarundinariawightiana* (Nees) C.S. Chao &Renvoize, which grows abundantly in and around the shola forests of Ootacamund in the Nilgiris District.

REVIEW OF LITERATURE

The Poaceae family, commonly known as the "Grass Family," is well represented, comprising approximately 620 genera and 10,000 species worldwide. According to (Lawrence, 2017), the family then included only 450 to 525 genera. In India, the family is represented by around 750 species. Within the monocotyledons, Poaceae is the second-largest family after Orchidaceae and ranks fourth among all flowering plant families, following Compositae, Orchidaceae, and Leguminosae. Members of Poaceae are vital to human life, as they are a primary source of food.

Bentham and Hooker placed Poaceae in the seventh series, Glumaceae. Rendle positioned Gramineae (an older name for Poaceae) after the order Triuridales due to their wind-pollinated, perianth-less flowers. Takhatajan separated Cyperaceae and Gramineae into distinct orders—Cyperales and Graminales—based on differences in stem morphology, leaf sheath arrangement, floral structure, pollen characteristics, ovule and embryo structure, and seed type. (Fox, Uniacke-Lowe, McSweeney, & O'Mahony, 2015) suggested that the order Cyperales, which includes both Cyperaceae and Gramineae, originated from Commelinales.

Members of the Poaceae family are predominantly herbaceous, though some may appear as shrubs or trees. Their stems are typically jointed and terete. Leaves are alternate, narrow, and have sheaths that split at the front, extending to the base and distinct from the blade; ligules are usually present. The inflorescence is typically a compound spike, and the flowers are either bisexual or unisexual, zygomorphic, and subtended by several distichous, imbricate glumes. The perianth is either absent or reduced to 2–3 minute, hypogynous, scaly lodicules. Flowers usually contain three stamens with versatile anthers. *Arundinariawightiana*Nees is a common underground shrub in the Nilgiri sholas and flowers annually in a gregarious manner (Gamble, 2011).

Bamboos are most abundant and diverse in South and Southeast Asia, where they are traditionally used for various purposes (Hanke, 1990). Bamboo flowering, particularly among species in the tribe Bambuseae of Poaceae, has always intrigued botanists. Flowering occurs only after long vegetative phases,Their lifespan varies from 20 to 60 years, and in some cases, can extend up to 120 years.Most bamboos are perennial and exhibit tree-like growth, flowering and setting seed only once. After this reproductive event, the flowering clumps often die (Pandey & Pandey, 2002); (Selvaraj, Chingath Ramanunni, Ponnusamy, Maran, & Kandhasamy, 2023).

Bamboo has become an important industrial raw material and is essential to the economies of many countries (John et al., 1995). The mass death of bamboo forests following gregarious flowering causes significant ecological disturbances, particularly affecting species like the giant panda (Fox et al., 2015); (Roberts, 1988). Understanding bamboo flowering cycles is challenging due to their long intervals and the scarcity of authentic records. Thus, flowering patterns are often deduced from scattered reports of past flowering events.

In Northeast India, a major bamboo flowering event in the early 1960s coincided with a severe famine. A similar event in Mizoram during the late During the 1970s, the rat population surged,with reports indicating that around 2.5 million rats were eliminated in 1978 alone (Ballabha et al., 2013). It is believed that bamboo flowering enhances rat fertility, leading to population explosions that devastate crops and cause famine and drought (Ghosh, 2008).

Bamboo rhizomes are of two main types Short, thick, and knotty, producing buds from which culms emerge (e.g., species of *Bambusa* and *Dendrocalamus*).Long rhizomes that spread underground and send up aerial shoots from rootlets or buds (e.g., *Melocanna*).

(Bulletin of the Botanical Survey of India, 1987)

India has a rich heritage of ethnobotanical knowledge, possibly among the oldest recorded systems globally. Most traditional medicinal systems, including Ayurveda, Unani, and Homeopathy, have their roots in ethnobotany. Over the past 30 years, studies have focused on the ethnobotany of specific tribes, regional floras, plant groups, diseases, and interdisciplinary aspects (Lu, Wu, Tie, Zhang, & Zhang, 2005).

Beyond food, many plants are valuable for their medicinal uses in traditional healing practices. Ethnobotany encompasses the use of plants for food, medicine, beverages, stimulants, poisons, timber, forest products, renewable energy sources, and environmental purification (Bejar, 2005). In remote and underdeveloped regions, Various parts of wild plants, including tubers, leaves, flowers, fruits, seeds,and grains, continue to serve as important sources of food (Barrau, 1959)

.(Kamboj & Dhawan, 1982)reviewed ethnobotanical work related to fertility regulation. Studies on specific plant categories have been published—on food by (Selvaraj et al., 2023) and (Ballabha et al., 2013), and on medicine by (Collection, 1940). (Brandis Dietrich, 1906a)documented 69 plants, including 33 newly identified species used by the Todas, Kotas, and Irulas in the Nilgiris.

(Gopalan et al., 1989)reported the ethnomedicinal use of 47 plant species across 42 genera and 33 angiosperm families in the Nilgiri Hills, based on surveys conducted between 1992 and 1998. Medicinal orchids such as *Cymbidium aloifolium*, *Nerviliaaragoana*, *Vanda tessellata*, and *Vanilla walkeriae* were documented in the Nilgiri Biosphere Reserve by (Balasubramanian, Rajasekaran, & Prasad, 2000). Ethnobotanical research methods were elaborated by (Shah, 2008).

A study by (Muniappan & Sundararaj, 2003)used DNA barcoding to identify a cryptic new grass species during an ethnobotanical survey among Western Ghats tribal communities.

To maintain health, humans require various nutrients including proteins, fats, carbohydrates, vitamins, and minerals. Dietary fiber, an indigestible plant component, also plays an important role in digestion. (Karanja et al., 2015) studied the nutritional and non-nutritional components of common and lesser-known foods, including bamboo.The edible part of bamboo consists of meristematic tissues, which rapidly divide and are encased in inedibleprotective sheaths (David, 1984).

Bamboo is also considered a medicinal plant in both traditional and modern literature. It is believed to treat various diseases and ailments (Ghosh, 2008). In oriental medicine, bamboo has been used to treat hypertension and cardiovascular diseases (Shukla, 2003)). Its therapeutic effects are attributed to phytochemicals with antioxidant properties (Constance Lincoln, 1969). Numerous studies have confirmed the antioxidant potential of bamboo leaf extracts (WU, YANG, WANG, WU, & LU, 2009); (Pandey & Pandey, 2002) ,According to Worobiec and Worobiec (2005) and Lu et al. (2005),

Vanithakumari et al. (1989) reported that ethanolic extracts from the tender shoots of *Bambusaarundinacea* decreased fertility in male rats. The same study noted that extracts from this species are traditionally used in Indian folk medicine for treating inflammation and ulcers. Additionally, bamboo culm extracts have been found to lower oxidative stress and suppress NF-κB activity (Lu et al., 2005).

Phenolic compounds were analyzed in the culms of five bamboo species in China Yushaniachungii, Fargesiarobusta, Fargesiadenudata, Fargesiarufa, and Fargesiascabrida—which are preferred foods for the giant panda (*Ailuropoda melanoleuca*). While most species contained small amounts of phenolic acids and flavonoids, flavonoids were not detectable in *F. robusta*. The phenolic profile varied according to species, age, and collection site (Goldberg, 2025). Other studies have also documented the presence of

phenolic compounds in bamboo culms and leaves (Nishina et al., 1991; Janzen, 1976; Selvaraj et al., 2023; Lu et al., 2005; Karanja et al., 2015; Panda, 1999).

Malik (2016) successfully isolated and purified four flavone C-glycosides from bamboo leaves using macroporous resin column chromatography followed by preparative high-performance liquid chromatography.

Recent research has highlighted multiple health benefits of bamboo extracts. For example, an ethanol/water extract of *Phyllostachys edulis* significantly reduced lipotoxicity caused by fatty acids, mitigated high-fat diet-induced obesity, hyperinsulinemia, and hyperglycemia, and also inhibited chemically induced breast cancer. These findings indicate that bamboo extracts may hold potential as complementary or alternative therapies for diabetes and breast cancer (Panee, 20

Methodology and Materials

Plant Material Collection

The study focused on the plant species *Sinarundinariawightiana* (Nees) C.S. Chao &Renvoize, belonging to the family Poaceae. Specimens were collected from the shola forests of Doddabetta, Mainala, Naduvattam, and Pykara in the Nilgiri District.

Taxonomy

Plant specimens were collected from January 2009 to October 2009 for taxonomic study. Collection was carried out using various field tools such as diggers, knives, and scissors. Key morphological features were recorded in a field notebook. The collected specimens were pressed using a plant press, dried, and mounted on standard herbarium sheets using gum and cellophane tape. Each herbarium label included details such as the botanical name, common name, locality, habit, habitat, and date of collection.

To prevent fungal infestation, dried specimens were treated with a 1% mercuric chloride solution in rectified spirit. Additionally, powdered naphthalene balls were used to deter insect pests. The morphological characters were examined using a 10x hand lens and a dissection microscope. Identification was performed using "J.S. Gamble (in The Flora of the Presidency of Madras)and confirmed with assistance from the Botanical Survey of India, Coimbatore. High-quality photographs of specimens were taken in the field using a digital camera.

Ethnobotany

An intensive ethnobotanical survey was conducted focusing on *Sinarundinariawightiana*, which is traditionally used by the Todas, Kotas, and Badagas of the Nilgiris Hills. Information was primarily gathered through direct interaction with members of these ethnic groups, especially regarding .The plant components utilized for nutritional and medicinal purposes. The data were validated by showing plant specimens to multiple informants from the same tribes.

Voucher specimens of the plant were gathered and processed on-site in the field, identified using Gamble's flora, and verified at the Botanical Survey of India, Coimbatore.

RESULTS

Study Area and Plant Collection

Various parts of *Sinarundinariawightiana* were collected between January 2009 and October 2009 from the shola forests of Doddabetta, Mainala, Naduvattam, and Pykara in the NilgiriDistrict. The Nilgiri administrative district spans an area of 984 square miles (2,549 square kilometers) and comprises four taluks: Ooty, Coonoor, Kotagiri, and Gudalur. The upper plateau, including Ooty, Coonoor, and Kotagiri, is situatedat an altitude of about 6,500 feet above mean sea level, while the lower plateau

(Gudalur) lies at about 3,000 feet. The shola forests surveyed lie between 1200 and 1800 meters in elevation.

Informant Selection

A total of **45 informants** were selected via a combined approach of **purposive and snowball sampling**. The participants were equally distributed among the three communities (Todas, Kotas, and Badagas; n=15 per community) and included a range of age groups (**18–30, 35–50, and 61+ years**) to effectively gather both contemporary and traditional information. The sample comprised **27 males and 18 females**. Data recording and verification involved documenting responses in notebooks and digital recorders. Voucher specimens were collected and deposited in a herbarium to corroborate ethnobotanical claims, and data consistency was validated through follow-up interviews with key informants.

Taxonomy

Species:*Sinarundinariawightiana* (Nees) C.S. Chao &Renvoize

Common Names: Nilgiri bamboo, Otmult, Oda-kuruthu, Ota-Kudi

Systematic Position:

- Bentham and Hooker: 7th series Glumaceae
- Rendle: Positioned Gramineae after Triuridales (due to wind-pollinated, perianth-less flowers)
- Takhatajan: Divided Cyperaceae and Gramineae into separate orders, Cyperales and Graminales
- Cronquist: Suggested origin from Commelinales

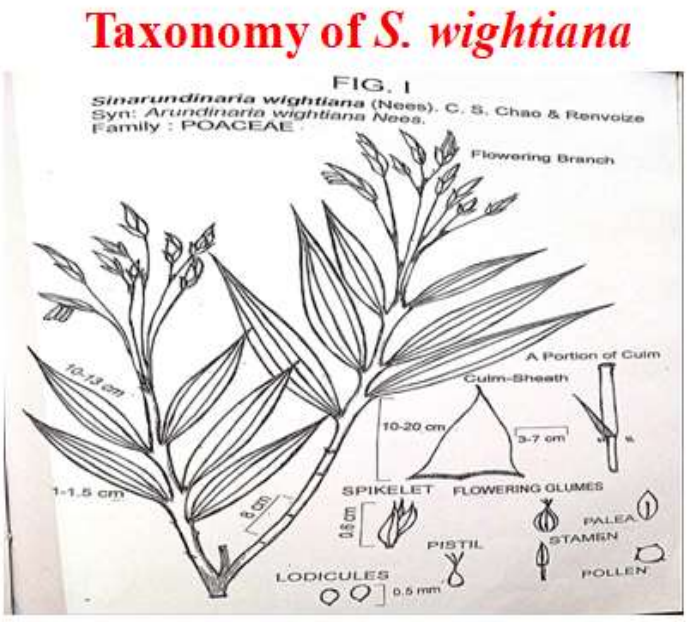

Figure 1: Taxonomy of S.wightiana

Morphological Description:

A perennial, erect woody shrub with slender culms emerging from short rhizomes. The culms are dark green and become yellowish brown at maturity, measuring 200–300 cm in length. Internodes are semiterete, 30–35 cm long, striate, and scaberulous; nodes are swollen. Culm sheaths are Measuring roughly 10–20 cm in length and 3–7 cm in width, narrowing slightly upwards, yellowish with tawny hairs, and bear ciliolate ligules.

The leaves are generally small, about 10–13 cm long and 1.1–1.5 cm wide, ovate-lanceolate in shape, smooth except for rough margins, and borne on short, thickened petioles. The leaf sheaths are ridged and lined with fine hairs along the edges. Ligules are short and rounded, while the tips of the leaves are tapering.

Inflorescence is an open, purplish panicle. Flowering branches are subtended by small bracts. Spikelets are numerous and multi-flowered. Fertile spikelets are pedicellate, and rachilla internodes are extended. Glumes are persistent. Lemma is similar to glumes but shorter, chartaceous, and scabrous. Fertile lemmas are ovate (5–6.5 mm), veined, and mucronate. Palea is veined and ciliate along the keels. There are three lodicules, three yellow, basifixed anthers, and a glabrous ovary. The style divides into three plumose stigmas.

Pollen grains are monoporate, oval, 45–68 µm in diameter, with pores measuring 3–5 µm and an annulus 4.0–4.3 µm wide. The exine is two-layered and granulate. The fruit is a caryopsis, Elliptic in shape, about 3–5 mm long, with a distinct deep groove on one side.

Table 1. Comparative morphological characters of the studied taxa across different taluks

Character	Coonoor	Kotagiri	Ooty	Gudalour
Habitat	Open rocky plains, grassland, understory	Understory	Open rocky plains, understory	Open grassland, understory
Rhizomes	Short	Slightly elongated	Short to slightly elongated	Short to slightly elongated
Culms	Erect, woody to semi-erect	Weak, slender to semi-erect	Erect, woody to slender	Semi-erect to erect
Branching pattern	Single to multiple branches per node	Single to two branches per node	Single to two branches per node	Single to multiple branches per node
Culm height (cm)	220–300	200–300	200–280	200–280
Culm colour	Yellowish brown to dark green	Green turning brown	Dark green to yellowish brown	Green turning brown
Internodes	Striate, ~35 cm	Striate or smooth	Scaberulous, ~30 cm	Shorter, smooth to striate
Culm sheath	7–10 cm, ciliate margins	7–20 cm, smooth or tawny hairs	7–15 cm, smooth	7–20 cm, smooth or tawny
Leaf size (cm)	~13 × 1.5	10–13 × 1–1.5	10–13 × 1–1.5	10–13 × 1–1.2
Leaf shape	Ovate-lanceolate to narrow-lanceolate	Lanceolate to ovate-lanceolate	Lanceolate	Ovate-lanceolate
Leaf surface	Glabrous to ciliate	Glabrous to scabrous	Glabrous to ciliate	Glabrous to ciliate

Ligule	Short to ciliolate	Short or blunt	Short	Short
Leaf apex	Acuminate to acute	Acute to obtuse	Acuminate to obtuse	Acute to obtuse
Inflorescence	Open or dense panicle	Open branched panicle	Dense panicle or spike-like	Loose spike-like or dense panicle
Spikelets	Solitary to many-flowered	Solitary to many-flowered	Solitary to many-flowered	Solitary to extended rachilla
Fertile lemma	Ovate, 5–6.5 mm	Ovate, ~5 mm	Ovate, 5–6.5 mm	Ovate, 6–6.5 mm
Palea	Veined, glabrous or ciliate	Veined, ciliate	Veined, glabrous or ciliate	Veined, glabrous or ciliate
Lodicules	2–3, ciliate	3, ciliate or glabrous	2–3, ciliate	2–3, glabrous
Anthers	3, yellow or short-filamented	3, yellow	3, yellow	3, yellow
Ovary	Glabrous to partially hairy	Glabrous to hairy	Mostly glabrous	Glabrous to hairy
Style & stigma	Divided or 3-parted, plumose	Plumose or divided	Plumose or divided	Divided or plumose
Pollen grains	45–68 µm, granulate/annulate	Monoporate or annulate	Oval or granulate	45–60 µm, granulate

(A) **(b)**

Figure 2: Habit of *Sinarundinariawightiana*

Figure 3: leaves & culm sheaths

Figure 4:young shoot &rhizhome

Figure 5: inflorescence &flower.

Figure 6: dying plant after flowering

Annual flowering was observed from August to October 2009. The species is common in the natural shola forests of the Nilgiris, particularly in Doddabetta, Naduvattam, Mainala, and Pykara, where it grows as an underwood shrub.

Ethnobotany

The Nilgiris region is inhabited by various indigenous groups such as the Todas, Irulas, Kurumbas, Paniyas, and Badagas, and Kattunayakas. *Sinarundinariawightiana* is known locally among the Todas, Kotas, and Badagas as "Otmult" and "Oda-kuruthu." The young, sprouting shoots are consumed by these tribes as a seasonal delicacy during the early monsoon (April to June).

Ethnobotanical information was gathered through direct interviews. The plant is reportedly used to treat ailments such as inflammation, cough, fever, wounds, and ulcers. Bamboo leaves are used in veterinary applications as well—for example, to treat diarrhea in cattle. A paste made from leaves and young shoots is administered orally with fodder to enhance milk yield and regulate menstrual flow in livestock.

For humans, leaf paste is applied externally to treat body aches caused by fever. The tender shoots are considered a nutritious food source. However, because of their heat-generating property, they are traditionally avoided during pregnancy and menstruation.

Table 2: Traditional Ethnobotanical Knowledge of *Sinarundinariawightiana*

Vegetative parts used	**cultural practices**	**Tribals Involved**	**Uses**
Young shoots	Prepared by boiling or fermentation and eaten infrequently as a food source.	Badagas, Todas,	Food
Leaves	Used in traditionaly, for digestive disorders	Todas, Kotas	Medicinal
Tender culms	Used in health-supportive preparations	Todas	Medicinal
Leaves	Supplementary fodder	Kotas, Badagas	Ethnoveterinary
Mature culms	Baskets, fencing, tools, temporary shelters	Todas, Kotas, Badagas	Domestic / Material

DISCUSSION

The findings of the present investigation regarding the taxonomy, ethnobotany, and phytochemistry of *Sinarundinariawightiana* (Nees) C.S. Chao &Renvoize are discussed in light of existing literature.

(Gamble, 2011) described the taxonomy of *Arundinariawightiana*Nees and its distribution in the Nilgiris. (Lawrence, 2017)outlined the systematic position of 264 vascular plant families, including Poaceae. Bamboo species, classified under approximately 45 genera, belong to a distinctive group within Poaceae, placed either under the subfamily **Bambusoideae** ((Unwin, 1927)or the tribe **Bambuseae**(Goldberg, 2025). These species differ from typical grasses due to their woody culms, shrubby or tree-like habits, nut- or caryopsis-like fruits, and presence of three or more stamens per flower. The leaves of bamboo species are characterized by a petiole between the blade and sheath, known as the "Bambusa type" (Brandis Dietrich, 1906b);(Malik, 2016); (Nag, 2001); (Panee, 2009).

In the present study,the plant species was identified with the help of The Flora of the Presidency of Madras authored by J.S. Gamble.and verified with herbarium specimens from the Botanical Survey of India, Coimbatore. Detailed taxonomical characters were examined in the laboratory, and corresponding photographs, illustrations, and herbarium specimens were prepared.

(Barrau, 1959)reported that most bamboo species exhibit tree-like growth and flower only once at the end of a long vegetative phase, after which the clump typically dies. Similarly, in the current study, *Sinarundinariawightiana* was found to flower after a vegetative phase, set seeds, and then die; however, the seeds produced were sterile.

Bamboo is increasingly recognized as an essential industrial raw material and plays a vital economic role in many countries (John et al., 1995). Fossilized bamboo leaves and pollen have been discovered in the Neogene deposits of Poland. Leaf fossils from the Late Miocene layers of the Belchatow Lignite Mine were identified as *Bambusalugdunensis*Saporta, marking the first record of this species in Poland's Cenozoic period. Pollen from the Middle Miocene (Badenian) deposits in Legnica, Lower Silesia, has

been classified as *Graminiditesbambusoides*Stuchlik, resembling modern *Arundinaria* species (Worobiec & Worobiec, 2005). In the present taxonomic study, pollen morphology of *Sinarundinariawightiana* was analyzed under a microscope, revealing monoporate, oval grains measuring 45–68 µm in diameter, with a pore size of 3–5 µm and an annulus 4.0–4.3 µm wide. The exine was thin, with a granulate surface.

In NortheastIndia as well as in various regions across the world., bamboo flowering is traditionally considered a harbinger of famine (Nag, 2001); (Nag, 2001). A 40-square-yard clump of *Dendrocalamusstrictus* has been reported to produce up to 320 pounds of seeds (Indian & Ayurveda, n.d.), with 800–1000 seeds per ounce (Deogun, 1936). The resulting seed abundance attracts seed predators—especially rats (*Mus* and *Rattus* species)—leading to population explosions and subsequent crop devastation. This cascade effect often results in food scarcity and famine.

Bamboo has been widely acknowledged in ancient and modern texts as a medicinal plant. Traditionally, it has been utilized in oriental medicine to manage hypertension and heart-related ailments (Dahlgren and Clifford, 1982). In the current study, it was noted that the clumps of *Sinarundinariawightiana* perished following the production of non-viable seeds.

Ethnobotanical knowledge in India is among the oldest in the world, forming the foundation of traditional medical systems such as Ayurveda, Unani, and Siddha. Over the past three decades, ethnobotanical studies have explored specific tribes, plant groups, regions, and diseases(Hanke, 1990). India's rich flora and vast tribal populations offer immense scope for ethnobotanical research, particularly in mountainous regions such as Central India, the Western Ghats, and the Himalayas.

Many wild plants continue to serve as important food sources for remote and tribal populations. (Barrau, 1959)and (Roberts, 1988)cataloged such plants in India. (Kamboj & Dhawan, 1982)reviewed plants used for fertility regulation. Notable ethnobotanical studies include those on food by (Selvaraj et al., 2023)and (Ballabha et al., 2013), and on medicinal plants by (Indian & Ayurveda, n.d.).

(Panda, 1999) reported that poultices made from the young shoots of *Bambusaarundinacea* effectively expel worms from ulcers. Juice from the plant is also applied to wounds and used to stimulate menstrual flow post-delivery. Bamboo is traditionally used to treat leprosy, fevers, haemoptysis, and threadworm infections in children. The leaves are employed in traditional veterinary treatments and as a decoction for hematemesis. Bamboo shoot pickles and curries are known to improve appetite and digestion. The siliceous concretion (bamboo manna) from female bamboo joints is used to treat fever, cough, consumption, paralysis, asthma, and snake bites.

(Vanithakumari, Manonayagi, Padma, & Malini, 1989) reported that ethanolic extracts of *Bambusaarundinacea* reduced male fertility in rats. (Muniappan & Sundararaj, 2003) documented the anti-inflammatory and anti-ulcer properties of this plant. They suggested that combining methanolic extracts of *Bambusaarundinacea* with NSAIDs could yield effective long-term treatments for chronic For treating inflammatory disorders such as rheumatoid arthritis in individuals with peptic ulcers.

(Selvaraj et al., 2023)noted that the tender shoots of *Arundinariawightiana* are consumed by the Todas, Kotas, and Badagas of the Nilgiris. In the present study, various tribal groups in the Nilgiri District were interviewed. It was found that *Sinarundinariawightiana* is known locally as "Otmult," "Oda-Kuruthu," or "Ota-Kudi." The tribes consume the sprouting shoots, which are boiled and used in pickles and curries. Bamboo leaves are used to treat diarrhea in cattle and are also fed to cattle and horses as fodder. Ground leaves are applied to treat ulcers, wounds, inflammation, fever, and cough.

According to Gopalan et al. (1989), bamboo contains a variety of both nutritive and non-nutritive components. The parts suitable for consumption are mainly the meristematic tissues, where rapid cell division and differentiation occur, and are protected by inedible leaf sheaths. Shoots are usually collected by cutting just above or below the ground, after which the sheaths are removed to reveal the edible core. While there are nearly 1,300 bamboo species, only a few genera such as *Phyllostachys, Bambusa, Arundinaria, and Dendrocalamus* are widely used as food sources.

In the current study, tender shoots of *Sinarundinariawightiana* were harvested between April and July 2009. Shoots were cut just above the soil, non-edible sheaths were removed, and the edible core was used for phytochemical analysis.

The biological importance of bamboo is largely attributed to its phytochemicals and antioxidant properties. Numerous studies have demonstrated the antioxidant potential of bamboo leaf extracts. For instance, Wu et al. (2009) investigated the impact of stem density on nutrient dynamics and utilization efficiency in dwarf bamboo, while Lu et al. (2005) successfully isolated four flavone C-glycosides from bamboo leaves using macroporous resin column chromatography followed by preparative HPLC.

In the current study, qualitative phytochemical screening of *Sinarundinariawightiana* indicated the presence of alkaloids, carbohydrates, proteins, flavonols, phenols, tannins, and steroids, whereas saponins, volatile oils, gums, and mucilage were absent. Quantitative analysis revealed that young shoots are rich in protein, while leaves contain comparatively lower protein levels. Carbohydrates were most concentrated in the rhizomes and least in the flowers. Phenolic compounds were highest in the flowers and lowest in the rhizomes, whereas flavonols were more abundant in leaves and scarce in rhizomes. Alkaloid content was greatest in flowers and lowest in leaves.

The marked morphological variation observed in *Arundinaria* populations of the Nilgiris, particularly in culm structure, branching, and inflorescence traits, reflects strong ecological influence and phenotypic plasticity. Such complexity has long limited morphology-based species delimitation in temperate bamboos (Janzen, 1976; Clark et al., 1995). Molecular phylogenetic studies using plastid and nuclear markers have clarified relationships within *Arundinaria*, revealing distinct evolutionary lineages despite morphological overlap (Triplett and Clark, 2010; Zhang et al., 2012). These findings suggest that the variation recorded in the present study represents adaptive divergence, emphasizing the importance of integrative taxonomic approaches for accurate species delimitation in Western Ghats bamboos (Bamboo Phylogeny Group, 2012).

SUMMARY

The Poaceae family, commonly known as the grass family, comprises numerous species valued for their edible and medicinal uses. This study aimed to explore theTaxonomy.Ethnobotany, and phytochemistry of *Sinarundinariawightiana* (Nees) C.S. Chao &Renvoize, which grows in and around the shola forests of Ootacamund in the Nilgiri District.

Specimens of the plant were collected and preserved as herbarium samples, and the floral parts were studied in detail. Ethnobotanical data revealed that *Sinarundinariawightiana* is used by the Todas, Kotas, and Badagas of the Nilgiri Hills for treating common ailments such as inflammation, ulcers, fever, cough, and wounds.

The sprouting vegetative tender shoots emerging from the soil are consumed as food. It is traditionally believed that the leaves help cure diarrhea in cattle. A paste made from the leaves and young shoots is administered orally as a nutritional supplement to cattle. This practice is believed to improve milk yield

and regulate menstrual cycles in livestock. For humans, the leaf paste is applied externally for relief from body pain caused by fever and to treat wounds. The tender shoots are also consumed as a dietary supplement; however, as they are considered to generate body heat, it is advised to avoid them during pregnancy and menstruation.

Phytochemical analyses were carried out to determine both the qualitative and quantitative composition of *Sinarundinariawightiana*.Qualitative analysis indicated that alkaloids, carbohydrates, proteins, flavonols, phenols, tannins, and steroids were present, whereas saponins, volatile oils, gum, and mucilage were not detected.

Quantitative analysis indicated that the young shoots contain the highest concentration of protein, while the leaves contain the least. Carbohydrates were found in highest concentration in the rhizomes and lowest in the flowers. The flowers exhibited the highest phenol content, while the rhizomes showed the lowest. Flavonol levels were greatest in the leaves and minimal in the rhizomes. Likewise, alkaloid concentration peaked in the flowers and was lowest in the leaves.

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