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Ethno medicinal, phytochemical and therapeutic importance of Bambusa arundinaceae: A review

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Abstract
Bans (*Bambusa arundinaceae)* (family Graminae) is an easily available and wildly growing plant found throughout the moist parts of India. Different parts of the plant like Siliceous deposits, young shoots, articulations, seeds, leaves, and roots are used for medicinal purpose in various traditional systems of medicines. It possesses *Mudirr-i-Hayd* (emmenagogue), *Dafi-i-Humma* (antipyretic), *Mudirr-i-Bawl* (diuretic), *Musakkin-i-Alam* (analgesic) properties and can be used in *Waja'al-Mafasil* (arthritis), *Waja'al-Zahr* (lumbago), and *Waja'al-Udhun* (earache). It can also be used in the disease of the urinary system like *Waram al-Mathana* (cystitis), and *Taqtir al-Bawl* (incontinence of urine) etc. The plant contains various bioactive compounds like silica 70 or Silicum as a hydrate of silicic acid, peroxide of iron, potash, lime, and alumina, proteins, phosphorus, iron, vitamin B, nicotinic acid, riboflavin, carotene, calcium phosphorus, thiamine, niacin, and oxalic acid. Diverse studies carried out on bans, by various researchers reported a wide spectrum of pharmacological actions like hepatoprotective, antioxidant, analgesic, antipyretic, anti-arthritic, and antidiabetic activities, etc. In the present review paper, an effort has been made to summarize the information described in classical Unani literatures and scientific research conducted on different parts of the *Bambusa arundinaceae* plant.

Keywords: *Bambusa arundinaceae,* Bans, *Mudirr-i-Hayd*, anti-arthritic, Unani

Introduction
In recent years, Unani drugs have got tremendous momentum worldwide in the global health care system. Several plants have been found to possess the therapeutic potential and are being used since time immemorial. Bans (*Bambusa arundinaceae)* are one such precious drug that has been in medicinal use in various traditional medicines like Ayurveda, Siddha, and others. The bamboo plant is very versatile and it provides numerous benefits to all the living beings comprising the environment. These are large woody grasses that belong to the family Graminae but it differs from the other members of the grass family by the presence of branches at each node [1, 2]. It is easily available and grows wildly throughout the moist parts of India. Different parts of the plant like Siliceous deposits, young shoots, articulations, seeds, leaves, and roots are used for medicinal purpose [3]. Among the wide range of actions possessed by this drug, some of the main activities includes *Mudirr-i-Hayd* (emmenagogue), *Dafi-i-Humma* (antipyretic), *Mudirr-i-Bawl* (diuretic), *Musakkin-i-Alam* (analgesic) activities, etc., thus it can be used in *Waja'al-Mafasil* (arthritis), *Waja'al-Zahr* (lumbago), and *Waja'al-Udhun* (earache), *Waram al-Mathana* (cystitis), and *Taqtir al-Bawl* (incontinence of urine), etc. [1, 2, 3].

Taxonomy

Kingdom	:	Plantae
Phylum	:	Tracheophyta
Class	:	Magnoliopsida
Order	:	Rosales
Family	:	Graminae
Genus	:	Bambusa
Species	:	B. arundinaceae

Vernaculars [4-11]

Arabic	:	Qasab
Persian	:	Nai
English	:	Spiny Bamboo, Thorny Bamboo
Greek	:	Bistaras, Qalaman, Aidqoon, Shalas
Hindi	:	Bans, Kantban, Bans-kapur, Bans-lochan
Urdu	:	Bansa
Sanskrit	:	Vansa, Bahupallava, Brihattrina, Dhatushya

Geographical Distribution

It grows wildly throughout the moist parts of India, particularly in the hill forests of the western and the southern part ascending up to an altitude of 3000 feet in the Nilgiris [4, 10, 11]. It is also cultivated in the plains of North-West India, and on the hills of Andhra Pradesh. Its occurrence can also be seen in the warmer parts of Ceylon and Burma [4, 6, 10, 11, 14].

Morphology

The plant of *B. arundinacea* is thorny, 24-30 m high and 15-18 cm in diameter [12, 4]. The erect stems are many, tufted on a stout rootstock, bending at the summit and pointed, hollow at the joints. Nodes are prominent, almost naked, shoots armed at the nodes with 2-3 stout recovered spines, internodes up to 45 cm, long having walls of 2.5-5 cm thickness. Leaves are up to18-20 cm long, linear, lanceolate, having downy sheathing, stiff tip, round base, one or more scabrous margins, narrow midrib, 4-6 veinlets with 7-9 intermediate and a few transverse pellucid glands. The inflorescence is an enormous panicle often occupying the whole stem. Involucre glumes are 2, acute, 5-8 mm, long, many nerved, and empty, floral glumes are 3-7, the uppermost 1-3 being male or neuter. Lodicules are 3, ovate or subulate, hyaline, ciliate, 1-3 nerved. Anthers are yellow, obtuse, short styles. The seeds are the size of oats. The grains are 5-8 mm long, oblong, beaked by the style base and grooved on one side [4, 6, 10, 11, 14, 15].

Unani description (*Mahiyat*)

Different varieties of Bambusa have been described in books however two are considered more important. One is solid, known as *bistaras*, which is used for making arrows and the other is hollow known as *shalas*, which is used for making flutes (this is a female plant). It also has many other varieties such as *soorulubat* and *Kubani*; these varieties possess several nodes, are more solid, and are used for making pens. One of its kinds found near the rivers is called *Dohais, Qorbas*. Its height reaches about 80 to 90 feet and flowering and fruiting start after 32 years. Flowers appear in spikes, seeds are similar to rice having central depression-like wheat. The nodes are 4 to 9 inches, white colored having a small hole. *Bambusa* is also classified based on spines. The thorns are hard, curved, and in the group of 2 to 3. The leaves are 8 to 9 inches long, and a half to 1 inch broad, apex acute blue colored smooth from above and hairs beneath. New leaves appear on the plant in rainy season, that are shiny green colored, later in winters they become yellowish but the *Bambusa* trees growing in moist areas remain green throughout the year. Its stem is often solid and curved at the base. The leaves of older stem fall whereas the younger stems remain wide-spread. Some types of bans yield *Banslochan* or *Tabashir*. The type of Bamboo which is hollow and possesses distantly placed nodes is mentioned to be medicinally better as compared to other varieties [7, 8, 9, 13].

Parts used (*Hasas Mustamila*)

Siliceous deposits young shoots, articulations, seeds, leaves, and roots [7, 9, 11, 16].

Temperament (*Mizaj*)

Cold and dry (2°) [7, 8, 9, 13, 17].

Table 2: Pharmacological actions (*Afaal)*

S. No	Pharmacological actions	References
1.	*Mudirr-i-Hayd* (Emmenagogue)	4,7, 9, 10,11,18, 19
2.	*Qatil-i-Kirm* (Anthelmintic)	7, 9
3.	*Dafi-i- Humma* (Febrifuge)	10
4.	*Mudrr-i-Bawl* (Diuretic)	7, 9, 18
5.	*Muqawwi* (Tonic)	4, 6
6.	*Musakkin-i-Alam* (Analgesic)	7, 9
7.	*Habis-i-Dam* (Hemostyptic)	7, 9
8.	*Mushtahi* (Appetizer).	6, 7, 9
9.	*Mukhrij-i-Janeen* (Abortifacient)_	20

Table 3: Therapeutic uses (Mahal-e-istemalat)

S. No	Therapeutic uses	References
1.	*Bars wa Bahaq* (Leucoderma)	4, 7, 9
2.	*Bawaseer* (Piles)	11, 10
3.	*Sil wa diq* (Tuberculosis)	4, 10
4.	*Warm-i-Shobaturriya* (Bronchitis)	4, 10, 19
5.	*Dama* (Asthma)	4, 6, 11, 10
6.	*Nafth al-Dam* (Hematemesis)	6, 11
7.	*Shaheeqa* (Whooping cough)	4, 6, 11, 10
8.	*Juzam* (Leprosy)	4, 7, 9,
9.	*Yarqan* (Jaundice)	10,
10.	*Waja' al-Mafasil* (Arthritis)	4,7, 9
11.	*Waj al-zhar* (Lumbago)	7, 9
12.	*Waja' al-Udhun*(Earache)	4,7, 9, 10,
13.	*Suzak* (Gonorrhea)	4, 10,
14.	*Aatshak* (Syphilis)	7, 9, 10,
15.	*Taqteer al-Bawl* (Incontinence of Urine)	4,7, 9

Dose (*Miqdar-e-khuraq*)
30-60 ml (in the form of decoction) [21]

Side effects (*Mazarrat*)
It has been mentioned to be unsafe for lungs [7].

Phytochemical Constituent
Tabashir contains silica 70 or silicum as a hydrate of silicic acid, peroxide of iron, potash, lime and alumina. The seeds had been reported to contain proteins, phosphorus, iron, vitamin B, nicotinic acid, riboflavin, and carotene. The seeds, tender shoots and fruits were reported to contain calcium phosphorus, thiamine, riboflavin, niacin; the tender shoot also contains oxalic acid. The leaves were reported to be highly nutritious as compared to other commonly used green fodders, containing proteins amino acids methionine and lysine, fiber, calcium, and phosphorus. Six microsatellites, three polymorphic and three monomorphic, were characterized in a bamboo species, B. arundinacea [4, 6, 11, 22, 23].

Pharmacological studies
Hepatoprotective effect: Chauhan *et al*. (2017) evaluated the hepatoprotective activity of methanolic extract of young shoots of *Bambusa arundinaceae* in thioacetamide-induced liver injury in rats. *In vitro* activity was assessed by monitoring cell viability in HepG2 and Hep3b tumor cell line and also in primary hepatocytes and *in vivo* activity was observed by measuring biochemical parameters along with the histopathological studies. The results showed that methanolic extract caused a significant dose-dependent increase in cell viability, reduced the elevated levels of biochemical parameters and histopathology also pointed towards the protective effect [24].

Antioxidant effect: Chauhan *et al*. (2017) assessed the antioxidant activity of different fractions (n-hexane, chloroform, ethyl acetate, and n-butanol) of methanolic extract of young shoots of *Bambusa arundinaceae*. Free radical scavenging activity by DPPH method, anti-lipid peroxidation effect and reducing power assay methods were used. The results demonstrated a good antioxidant effect which may be attributed to the high amount of flavonoid and phenolic contents. Among the entire fractions, ethyl acetate fraction showed superior antioxidant activity [25].

Analgesic and Antipyretic effect: The ethanolic extracts of *Bambusa arundinaceae* leaves were studied for their analgesic and antipyretic activities in rats. The result showed a dose-dependent increase in latency time and inhibition in pain sensation in both high and low doses, in a pattern similar to standard drug diclofenac sodium; a significant reduction in the pyrexia was also seen [26].

Antidiabetic effect: Nazreen *et al*. (2011) studied the hypoglycemic effect of ethanolic extract and different fractions of *Bambusa arundinacea* leaves in streptozotocin-induced diabetic rats. Lipid peroxidation, reduced glutathione levels and activity of antioxidant enzymes along with histological analysis were taken as different parameters. On administration, the ethanolic extracts at a dose of 150 mg/kg and 350 mg/kg caused a significant hypoglycemic effect. The ethyl acetate fraction was more potent in lowering the blood glucose levels compared to standard drug glibenclamide (95 ± 10.64 mg/dL) (3 mg/kg) with insignificant ulceration as compared to the standard [27]. The aqueous ethanolic extracts of the seeds of *B. arundinacea* were tested for anti-diabetic activity using alloxan induced diabetic rats and compared with standard. The result expressed that significant protection and maximum reduction in blood glucose was observed in alloxan induced diabetic rats in comparison to the standard glibenclamide [28].

Anti-arthritic effect: Rathod (2012) assessed the Anti-arthritic activity of *Bambusa arundinacea* in treating Rheumatoid Arthritis (RA) using CFA-induced arthritis in female Wistar rats. The parameters observed included assessment of bone erosion by histological and radiological joint analysis, Paw volume, Arthritic Index, Rheumatoid Factor, Erythrocyte Sedimentation Rate (ESR) and Spleen histopathology. The results demonstrated a significant (dose-dependent) decrease in bone erosion, spleen enlargement & rheumatoid factor as compared to the control group [29].
Ethanolic extract of Bambusa arundinaceae root was investigated for its anthelmintic activity against Pheritima posthuma. The extract showed significant anthelmintic activity in a dose dependent manner compared to the control [30].
Antifertility: An ethanolic extract of *Bambusa arundinacea* tender shoots (BASE) was found to cause a reduction in fertility of male rats. The number of spermatozoas in the caput as well as cauda epididymis was decreased concomitant with a decrease in the spermatozoa motility. The weights of testes, epididymides, vas deferens and prostate were also significantly decreased (Vanithakumari *et al*., 1989) [31].

Laxative effect: The ethanolic extract of shoot of *B. arundinacea* showed significant laxative activity in mouse model; also the phytochemical investigation identified a total of thirty compounds in the extract (Zihad *et al*., 2018) [32].

Conclusion
The present literature review of *Bambusa arundinacea* supports its potential as a miraculous medicinal plant. Numerous phytochemical and pharmacological studies that have been conducted on different parts of Bambusa

arundinaceae support its use in traditional system of medicine. In view of the beneficial nature of the plant, more research can be done to investigate the unexplored potential of this plant, as well as the mechanism of action behind the know potentials.

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