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Review Article

Ethnobotany and Traditional Knowledge of Bamboos (Poaceae: Bambusoideae) in Asia and Their Applications in the Complementary and Alternative Medicine: A Review

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ABSTRACT

Plants are considered a great source of various herbal medicines in the treatment of certain diseases and ailments. There is a growing interest in the utilization of indigenous medicinal plants as the source for complementary and alternative medicine (CAM) due to the significant contribution of plant-based materials to the pharmaceutical field. Bambusoideae is a large grass family of Poaceae, comprising approximately 119 genera and 1482 described species. About 70% of the bamboo forests are covered throughout Asia. This study aims to provide an informative review of the ethnobotanical significance and traditional knowledge of medicinal plants belonging to the Bambusoideae. This review comprises informative data on medicinal plants, their uses, and parts used by indigenous people and native communities in Asian regions. In line with this review, bamboo has made significant contributions to the ethnobotanical field, specifically as therapeutics for specific diseases. Ethnobotanical data has also made a successful contribution to the CAM. Therefore, the present review on ethnobotany and traditional knowledge of bamboo is expected to have many benefits and could be a good starting point for future work in the pharmaceutical field, both locally and internationally.

Key words: Asia, Bambusoideae, Complementary and alternative medicine, Ethnobotany, Traditional knowledge.

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INTRODUCTION

Early plants started colonizing the ground about 450 million years ago and have taken advantage of their versatile metabolism to produce various natural medicinal products.[1] One common strategy used to identify new drugs is by exploring folk herbal extracts.[2] The earliest scientific documentation of potential medicinal use of bamboo was published in the early 1960s,[3] followed by a series of studies conducted by Shibata et al. in the 1970s.[4-8] Bamboo, as a biomedical research topic, was relatively silent during the 1980s and 1990s, but research interest has increased worldwide since the beginning of this century.[9] Thus, bamboo plants play a significant role in traditional Asian medicine over six decades ago.

The family Poaceae (grasses), known as bamboo (or *Bambu*, a vernacular word of unknown Oriental origin), includes 12 subfamilies, the largest of which is the Bambusoideae, which includes 119 genera and approximately 1482 species. These species are further divided into three tribes: Bambuseae (tropical woody bamboos with 66 genera and 812 species), Arundinarieae (temperate woody bamboos with 31 genera and 546 species), and Olyreae (herbaceous bamboos with 12 genera and 124 species).[10-12] The molecular phylogenetic results support the recognition of three tribes within the Bambusoideae.[11,13] These grasses have woody culm with leaves adjusted to support and protect the tender young shoots, an outer ligule (contraligule) on the foliage leaves, gregarious monocarpy (ranging from a few years to 120 years for the flowering cycle), complex vegetative branching, and have bisexual flowers.[14-16] Herbaceous bamboos typically lack differentiated outer ligules and culm leaves, unisexual spikelets, and have confined vegetative branching.[14,16] Excluding the New Guinea endemic Buergersiochloa, all Olyreae have crenate (olyroid) silica bodies.[17-19]

According to the Food and Agriculture Organization (FAO),[20] Asia contributes to the world's largest source of bamboo resources. However, there is no comprehensive and up-to-date checklist of plants, particularly the medicinal plants of Asian regions. Notably, Asia and Pacific regions account for about 80% of bamboo forests and species available worldwide.[21] Within its temperate and tropical climates, Asia has many advantages for bamboo cultivation, accounting for more than 900 species in 40-50 genera. Many Asian countries such as China, India, Thailand, Indonesia, Vietnam, and Myanmar are rich in bamboo resources.[22] As a result, this review article focuses on the ethnobotanical and traditional knowledge of medicinal plants in the Bambusoideae specifically used by indigenous people and native communities in Asian regions. The medicinal plants, together with their uses, are reviewed accordingly throughout this article. Likewise, the applications of complementary and alternative medicine (CAM) are also addressed.

BACKGROUND OF BAMBOOS IN ASIAN REGIONS

Bamboos are known to be durable and fast-growing with short harvest periods. Furthermore, they are sustainable (in terms of yield), inexpensive, and have

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supported livelihoods throughout history. These factors make bamboo a reliable resource for meeting the needs of an increasing population, market, and development.[23-24] Thus, it has been so intricately related to the livelihood of Asia people, representing the bamboo civilization on the continent.[25] These grasses are found throughout Africa, Latin America, and Asia, but their origins can be traced back to Southeast Asia. Bamboo's geographical distribution is generally determined by climates.[26] It is widely distributed in the tropical and subtropical zones approximately between 46° N and 47° S latitude, reaching elevations as high as 4000 m in the Himalayas and parts of China as it adapts easily to a variety of climatic and soil conditions.[27-28] Bamboo thrives in temperatures ranging from 8.8 to 36°C,[29] but some species can still grow in colder climates with temperatures as low as -20°C.[30] Bamboo grows best in areas with high rainfall, ranging from 1270 mm to 6350 mm or more,[31-32] thus highlighting the significant impact of rainfall on the distribution and growth of these species.

As shown in Figure 1, the Asian-Pacific Region (I), the American Region (II), and Africa (III) are the main producing areas of bamboo. Around 80% of the world's bamboo forest is located in the Asian-Pacific regions,[21] whereas India and China account for approximately 70% of Asia's bamboo forests.[22] Along with a recent report, Asia is the world's largest source of bamboo resources.[20] China has the most bamboo species (626 species),[33] followed by India, which has 115 species.[34] Surprisingly, about 25% of all bamboo species were discovered in India, particularly in the biodiversity hotspot regions like northeast India and western Ghats.[35-36] Bamboo fossil records in Asia suggest that bamboo was most likely dispersed from India following the collision of the Eurasian Plate with the Indian Plate. Nevertheless, more fossil records from Asia are required to validate this dispersal route because another from Europe cannot be ruled out.[37]

More than two million tonnes of bamboo shoots are consumed in Asia annually. Since ancient times, bamboo products have been consumed either as fresh, dried, canned, boiled, fermented, or as medicine. These practices are common in many Asian countries, including Bhutan, China, Indonesia, Japan, Korea, Malaysia, Nepal, and northeast India.[12,38-40] Both fresh and fermented bamboo shoots are crucial sources of income for rural communities because they are high in fat, carbohydrates, protein, minerals, vitamins, enzymes, coenzymes, reducing and non-reducing sugars, and lactic acid (if fermented).[41-49] Thus, they have been widely used as a source of nutraceutical products. For instance, underground shoots of bamboo are cooked as a vegetable soup ingredient called *laswa* in the Philippines.[50] Bamboo salts (*jookyeom*) are roasted with regular salt, yellow clay, and bamboo culms in Korean folk medicine to treat chronic diseases.[51-53] Tender shoots of a few species are consumed in India as pickles, vegetables, and curries.[43,48,54] In most bamboo-growing countries, clean young bamboo leaves are dried, roasted, and consumed as tea. It is considered a tasty and healthy beverage.[40]

ETHNOBOTANY AND TRADITIONAL KNOWLEDGE OF BAMBOOS IN ASIA

In 1896, American botanist John Harshberger coined the term ethnobotany, which refers to "the study of plants used by humans".[55] Ethnobotany is a branch of botany that focuses on products derived from natural sources such as food, coloring agents, fiber plants, fertilizers, building materials, dyes, tan, taboos, avoidance, magico-religious beliefs about plants, and other functional and harmful plants.[56-58] In other words, ethnobotany is the study of how people in specific regions and cultures use indigenous plants.[59] It is now widely acknowledged that ethnobotany is closely tied with the natural and traditional relationship between plants and humans in a dynamic ecosystem. Ethnic people have a strong belief in native folklore medicine as part of the system and rely heavily on plants for almost all of their daily needs and requirements.

Traditional medicine is a collection of empirical practices that are inextricably associated with the religious practices and beliefs of indigenous cultures. Traditional medicine relies heavily on medicinal plant knowledge. According to the World Health Organization, roughly 80% of the world's population (six billion people) depends primarily on traditional medicines.[60] In addition, anthropological research has been extensively conducted.[61-62] However, traditional medicine is widely used in modern society despite the archaeological record's remarkable lack of visibility of such medicine. This review article discusses the ethnobotanical parts and traditional knowledge of medicinal plants from the Bambusoideae used by indigenous people and native communities in Asian countries. Based on Table 1, the medicinal properties of bamboo plants and their applications are discussed throughout this article.

APPLICATION OF BAMBOOS IN THE COMPLEMENTARY AND ALTERNATIVE MEDICINE

For Millennia, Bamboos have been utilized in traditional Asian medicine, particularly in China and India.[115-116] In folk medicine, all parts of this plant are used. Cough, fever, leprosy, hypertension, lung inflammation, cardiovascular diseases, arteriosclerosis, osteoarthritis, and osteoporosis are all treated with the leaves.[115,117-118] In addition to being a food source, primarily in Asian countries, bamboo shoots are used to cure and prevent cancer and cardiovascular complications,

Figure 1: A sketch map of world bamboo distribution.[22]

Table 1: Summary of bamboos as medicinal plants according to Asian countries.

Scientific names	Common names	Parts used	Preparation	Application	Ailments treated	Places	References
Bangladesh							
Bambusa multiplex (Lour.) Raeusch. ex Schult.f.	Thirwa	Leaves	Juice	Oral	Fevers	Chittagong Hill Tracts	[63]
		Roots	Paste	Topical	Abscesses, itches		
Bambusa oldhamii Munro	O-anna	Leaves	Juice	Oral	Fevers		
		Roots	Paste	Topical	Abscesses, itches		
Bambusa tulda Roxb.	Bans	Soft inner core of stems	Decoction (with *Terminalia belerica* sliced fruits, *Terminalia chebula* fruits, *Phyllanthus emblica* fruits, *Solanum violaceum* sliced leaves, and *Drynaia quercifolia* roots	Oral	Cardiovascular disorders, weakness of heart	Muktipara, Chuadanga Sadar, Chuandanga District	[64]
Bambusa bambos (L.) Voss	Kanta Bans	Stems, leaves, roots, sprouts, barks	-	-	Laxative, leukoderma, inflammation, strangury, cough, cold, consumption, asthma, emmenagogue, bleeding disorder	Rangamati Hill District, Chittagong Hill Tracts	[65]
Bambusa tulda Roxb.	Mitinga	Leaves			Arthritis, rheumatism		
Bambusa arundinacea (Retz.) Willd.	Bans	Stems	-	-	Leukoderma	Kushtia District	[66]
		Leaves			Cough, cold		
		Roots			Joint pains		
Cambodia							
Bambusa spp.	Russey Srok, Russey Prey	Woods	Decoction	Oral	Liver disorders	Phnom Penh; Kandal; Takeo; Kampong Speu	[67]
China							
Phyllostachys nigra (Lodd. ex Lindl.) Munro	-	-	-	-	-	Chuxiong, Central Yunnan	[68]
Bambusa pervariabilis McClure	Zhu Ru	Shavings	-	-	Clearing heat, stopping bleeding	Sansui County	[69]
Dendrocalamus hamiltonii Nees & Arn. ex Munro	Aqqyul	Water inside the culms	Burnt	Oral	Fever	Xishuangbanna, Yunnan Province	[70]
		Culms	Boiled with ginger and garlic		Food poisoning		
		Culm	-	-	Oedema		
Bambusa vulgaris Schrad. ex J.C. Wendl.	-	-	Boiled with *Nicolsonia renifolia*, *Dillenia indica*, and *Mahonia* spp.	Taken with sugar and rice	Hepatitis		
Gigantochloa albociliata Munro		Roots, buds	Decoction	Oral	Dysmenorrhea, irregular menstruation, postpartum blood clots		
Phyllostachys nigra (Lodd. ex Lindl.) Munro		Leaves	-	-	Malaria		
Schizostachyum funghomii McClure		Nodes	Decoction with *Areca catechu* petioles	Oral	Headache, body ache, common cold, increase appetite		
Dendrocalamus spp.		Roots	Decoction with leaves of *Areca catechu* fruit or *Alpinia galanga*, *Gendarussa vulgaris* roots, and *Adhatoda vasica* roots		Induce urination		

Fargesia spp.		Red bamboo fungus			Skin inflammation		
Indosasa pingbianensis McClure		Shoots			Common cold, headache		
Phyllostachys glauca McClure	-	Leaves	-	-	Cough, lung inflammation	Yunnan	[71]
Phyllostachys heterocycla (Carrière) Matsum.		Sap of young culms			Cough, throat inflammation		
India							
Bambusa arundinacea (Retz.) Willd.	Moongil	Young leaves, terminal buds (with turmeric leaves)	Grounded with *Aloe vera*, paste	Topical	Fractured bones	Pudukottai District, Tamil Nadu	[72]
Bambusa arundinacea (Retz.) Willd.	Moongil	Seeds, seed oil	Paste	Oral	Rheumatism	Tirunelveli Hills of Western Ghats	[73]
Bambusa arundinacea (Retz.) Willd.	Baans	Roots	Decoction	Oral	Kidney stone	Udhampur District of Jammu and Kashmir	[74]
Bambusa vulgaris Schrad. ex J.C. Wendl.	-	-	-	-	Type 2 diabetes	Tiruvallur District, Tamil Nadu	[75]
Dendrocalamus strictus (Roxb.) Nees	Math	Gums	Soaked in water	Topical in ear	Ear ache	Amravati District, Maharashtra	[76]
			Powdered	Oral with water	Tuberculosis		
Bambusa sp.	Bans	Leaves	Juice	Oral	Cancer	Chhattisgarh	[77]
		Barks	Decoction				
		Seeds	Mixed with Shahad (honey)				
Dendrocalamus strictus (Roxb.) Nees	Bans	Leaves	Decoction	-	Clear uterus	Chittorgarh District, Rajasthan	[78-79]
Bambusa arundinacea (Retz.) Willd.	Mungil	Leaves	Juice (mixed with honey)	Oral	Cough in children	Atoor Village, Kanyakumari District, Tamil Nadu	[80]
Bambusa arundinacea (Retz.) Willd.	Mulmunkil	Roots	Decoction	-	Skin diseases	Kanyakumari District, Tamil Nadu	[81]
		Leaves	Infusion				
Bambusa balcooa Roxb.	-	-	-	-	-	Tripura	[82]
Dendrocalamus giganteus Munro	Wa Mishel, Kepaii/Mpin	Fresh culms	Scrapped (wool made)	Topical	Fresh cuts and wounds	North Cachar Hills of Assam	[83]
Bambusa arundinacea (Retz.) Willd.	Moongil	Seeds	-	-	Rheumatism	Pachamalai Hills of Tamil Nadu	[84]
Bambusa vulgaris Schrad. ex J.C. Wendl.	Mughil	Leaves	Extracted	Oral	Reduced sperm count	Kathiyavadi Village, Vellore District, Tamil Nadu	[85]
Bambusa arundinacea (Retz.) Willd.	Veduru	Leaves	Decoction	Oral	Asthma	Andhra Pradesh	[86]
Bambusa tulda Roxb.	Bans	Roots	Decoction	Oral	Piles, constipation	Assam	[87]
Bambusa tulda Roxb.	Ejo				Tetanus infection		
Dendrocalamus giganteus Munro		-	-		Steroid drug		
Dendrocalamus strictus (Roxb.) Nees	-	Siliceous matter		-	Astringent, tonic	Arunachal Pradesh	[88]
		Leaves	Decoction		Abortifacient		
Schizostachyum capitatum (Munro) R.B.Majumdar		Leaves	Infusion		Stomach pain		
Bambusa bambos (L.) Voss	Moongil	Seeds	Paste	Topical	Rheumatism	Palamalai Region of Eastern Ghats	[89]

		Young shoots	Cooked	Eaten with rice	Rheumatism, malaria		
Bambusa vulgaris Schrad. ex J.C. Wendl.	-	Barks	-	-	Astringent, emmenagogue	Subhartipuram, Meerut District, Uttar Pradesh	[90]
					Heart problems, malaria, fevers		
		Leaves	Boiled, extracted		Clean-out dilation and expulsion after parturition		
Dendrocalamus strictus (Roxb.) Nees	-	Leaves	Young stem cooked	Eaten with rice	Fever	Nokrek Biosphere Reserve, Meghalaya	[91]
Bambusa tulda Roxb.	Waa	Tender shoots	Decoction, paste	Topical	Wounds and injuries	Manipur	[92]
Dendrocalamus strictus (Roxb.) Nees	Saneibi		Decoction				
Bambusa arundinacea (Retz.) Willd.	-	Young shoots	Poulticed	Topical	Dislodgment of worms, ulcers	Kanyakumari District, Tamil Nadu	[93]
		Leaf buds	Decoction	-	Discharge of menses		
		Tender shoots	Cooked (curry)	Oral	Indigestion		
		Whole plant	Paste (with turmeric and *Areca catechu*)	-	Contusion, swellings		
		Shoots	Extracted	Topical	Bandage for varmam		
Cephallostachium capitatum Munro	Yabing	Water inside the bamboo	-	-	Dysentery, diarrhea	Apatani Plateau, Arunachal Pradesh	[94]
Bambusa bambos (L.) Voss	Bidiru	Grains (infested stem by Sigare or *Dendrophthoe falcata*)	Rice prepared	Oral	Various diseases (believed as *Sanjeevani*)	Savandurga Forest, Bangalore Rural District, Karnataka	[95]
Indonesia							
Dendrocalamus asper (Schult. & Schult.f.) Baker ex K.Heyne	Bambu Betung	Stems	Pounded	-	Muscle soreness	Ngadisari Village, Sukapura District, Probolinggo Region	[96]
Phyllostachys sulphurea (Carrière) Rivière & C.Rivière	Awo Ridi	Roots	-	Oral	Internal infection	Batukede Village, Baroko District, Enrekang Regency.	[97]
Bambusa vulgaris Schrad. ex J.C. Wendl.	Bambu Kuning	Stems	Decoction	Oral	Malaria	Anjir Pulau Pisau Village, Kahayan Hilir District, Pulang Pisau Regency, Central Kalimantan-Indonesia	[98]
Bambusa vulgaris var. *striata* (Lodd. ex Lindl.) Gamble	Haur Koneng	Water inside the cavity bamboo	-	Oral	Liver disease, gonorrhea	Karangwangi Village, Cianjur, West Java	[99]
Dinochloa scandens (Blume ex Nees) Kuntze	Cangkoreh		Juice	Topical	Cough		
Gigantochloa atroviolacea Widjaja	Awi Hideung		Tear water (*peureuh*)		Treating and healing eyes		
Gigantochloa pseudoarundinacea (Steud.) Widjaja	Awi Gombong		Morsel	Oral	Cough		
Bambusa vulgaris var. *striata* (Lodd. ex Lindl.) Gamble	Haur Koneng	Buds			Cancer		
Dinochloa scandens (Blume ex Nees) Kuntze	Cangkoreh	Water inside the culm			Eye drops, cough		
Gigantochloa apus (Schult.f.) Kurz	Awi Tali	Roots	-	-	Kidney, ulcer, diabetes, spleen, liver, breast cancer, blood cancer, cough, hypertension	Karangwangi Village, Cidaun Sub-District of Cianjur, West Java	[100-102]
		Culms			Induced childbirth, skin scars, wounds		
Gigantochloa hasskarliana (Kurz) Backer ex K.Heyne	Awi Lengka	-			Breast cancer, insomnia, heart palpitation		

Gigantochloa apus (Schult.f.) Kurz	Tiying Tali	-	-	-	Various diseases	Kedewatan Village, Ubud District, Gianyar Regency, Bali Province	[100, 103-104]
Korea							
Phyllostachys bambusoides Siebold & Zucc.	Wangdae	Sprouts	Decoction	Oral	Pollakiuria	Eastern Mountainous Region of North Jeolla Province	[105]
Sasa borealis (Hack.) Makino	Joritdae	Leaves	Infusion		Common cold		
		Leaves, stems			Hyperthermia, hypoglycemia		
		Roots	Decoction		Common cold		
Phyllostachys bambusoides Siebold & Zucc.	Wangdae	Leaves	Infusion		Common cold		
		Roots	A sweet drink with fermented rice		Lumbago	Gayasan National Park	[106]
Sasa coreana Nakai	Sinidae	Leaves	Decoction, infusion		Common cold		
Laos							
Gigantochloa parvifolia (Brandis ex Gamble) T.Q.Nguyen	Mai Sod	Leaves	Steam sauna, bath	Topical	Postpartum recovery, anemia (dizziness, headache), puerperal fever, lactagogue, postpartum mother recovery, postpartum secondary hemorrhage, perineal healing, retraction of the uterus	Nakai District, Khammouane Province	[107]
Bambusa vulgaris Schrad. ex J.C. Wendl.	Mai Sang Kham	Roots	Boiled (with the root of Mak Feuang Phu)	Oral	Kidney stones	Paksan District, Bolikhamsai Province	[108]
Malaysia							
Bambusa sp.	Buluh	Young shoots	Boiled	Oral	Postpartum diet	Kampung Menunggui, Kota Belud District	[109]
Philippines							
Bambusa vulgaris Schrad. ex J.C. Wendl.	Kawayan	Stems	Decoction	Oral	Allergy	Batan Island of Batanes	[110]
			Burnt with coconut oils	Topical (ash)			
Bambusa vulgaris Schrad. ex J.C. Wendl.	Kawayan	Leaves	Boiled	Topical	Postpartum wash	Central Philippines (including Guimaras Island)	[111]
Schizostachyum lumampao (Blanco) Merr.	Bagakay	Stems	Burnt	Topical (ash)	Infant's freshly-cut navel		
Thailand							
Bambusa bambos (L.) Voss	-	Leaves	Powdered	Oral	Constipation	Chawang District, Nakhon Si Thammarat Province	[112]
			Bolus		Bilharzia		
Dendrocalamus hamiltonii Nees & Arn. ex Munro	-	-	-	-	Fungal infection	25 Karen Villages (Northern and Western Thailand)	[113]
Bambusa bambos (L.) Voss	Phai Pa	Young stems	Decoction	Potion, oral	Leprosy, lipoma	Khao Luang Region, Nakhon Si Thammarat	[114]

Table 2: Bamboos in traditional medicinal systems.[125]

Name	Constituents	Health benefits
Ayurveda, Tibetan, and Unani Traditional Medicines		
Tabasheer	Siliceous secretion is often called bamboo silica or bamboo-manna found in the hollow internodes of various species of bamboos. It may be transparent, translucent, chalky, or mainly composed of silicic acid (up to 96.9%) with organic matter above 1%.	It acts as an antispasmodic, aphrodisiac, astringent, cooling tonic, cough, febrifuge, stimulant, and relieves asthma.
Sitopaladi Churna	Powder made with tabasheer as the main ingredient, plus small amounts of long pepper, cardamom, and cinnamon in the base of sugar.	A popular remedy for common colds, coughs, sinus congestion, sore throats, tuberculosis, and other lung diseases.
Traditional Chinese Medicine		
Chenjin Wan	Arisaema, Bamboo shaving and Tabasheer, Chrysanthemum, Citrus, Fritillaria, Ophiopogon, Salvia, apricot seed, biota, ginger, hoelen, silkworm.	Phlegm mist obstructing the orifices yields symptoms of blurred vision, insomnia, and restlessness.
Gualou Zhishi Tang	Bamboo shaving and sap, Citrus, Fritillaria, Gardenia, Platycodon, Saussurea, Trichosanthes seed, chih-shih, licorice, scute, etc.	For reducing thick phlegm that is hard to expectorate.
Jupi Zhuru Tang	Bamboo shavings, Citrus, Pinellia, hoelen, licorice.	Relieving phlegm.
Qinghuo Ditan Tang	Arisaema, Bamboo shaving and Tabasheer, Chrysanthemum, Citrus, Fritillaria, Ophiopogon, Salvia, apricot seed, biota, ginger, hoelen, silkworm.	Phlegm mist obstructing the orifices yields symptoms of blurred vision, insomnia, and restlessness.
Qinggong Tang	Bamboo leaf, Forsythia, Ophiopogon, Scrophularia, lotus plumule, rhino horn.	Fever with dryness, penetrating to the pericardium, with delirium
Qingluo Yin	Bamboo leaf, Dolichos flower, Lonicera, Luffa, Mirabilitum, lotus leaf.	Fever with light-headedness, blurry vision, or headaches.
Xiaoer Qizhen Dan	Arisaema, Cinnabar, Tabasheer, realgar.	For coughing, phlegm, and wheezing.
Zhuye Shigao Tang	Bamboo leaf, Ophiopogon, Oryza, Pinellia, ginseng, gypsum, licorice.	Fever with dryness, insomnia, and irritability.

improve digestion, and treat jaundice.[119-120] They are also used to treat epilepsy, dysentery, diabetes, respiratory problems, bacterial infections, nervous system disorders, skin ulcers, and as a diuretic.[24,117]

Complementary and alternative medicine (CAM) is described as "healthcare and medical practices that are not currently an integral part of conventional medicine".[121] Herbal drugs, traditional medicines, meditation, and religious ceremonies are cases of such practices. More than 40% of western populations practice CAM for a variety of health conditions.[122] Interestingly, *Bambusa* sp. stem was discovered to be used as a CAM by diabetes mellitus patients.[123] Due to its connection with Traditional Chinese Medicine (TCM), the findings of moso bamboo (*Phyllostachys edulis*) in treating diabetes mellitus are also being further investigated.[124] As a result, Asian bamboo species are widely used for medicinal purposes, implying that they could be a CAM in the future due to the uniqueness of their ethnobotany connections. Some lists of bamboo products or parts that were used as CAM are presented in Table 2.

CONCLUSION

In conclusion, plants belonging to the Bambusoideae have contributed massively to ethnobotanical and pharmacological fields. This review article summarized bamboo plants that have been used by indigenous people and native communities in Asian countries, specifically to treat certain diseases and ailments. Interestingly, these documented plant species, together with their medicinal values, could be a good starting point for future work in the CAM. In order to prevent the destruction of plant resources and materials, it is vital to correctly identify them for proper harvesting, as well as the chemicals extracted. Specifically, it is crucial to ensure the correct raw materials are being harvested and supplied for pharmaceutical use, thereby facilitating the conservation and utilization of indigenous medicinal plants in the future. In other words, people are aware of and value indigenous knowledge and heritage. Hence, it is proven that ethnobotanical study could be one of the useful tools to document and record potential medicinal plants, including Bambusoideae, especially in the Asian regions.

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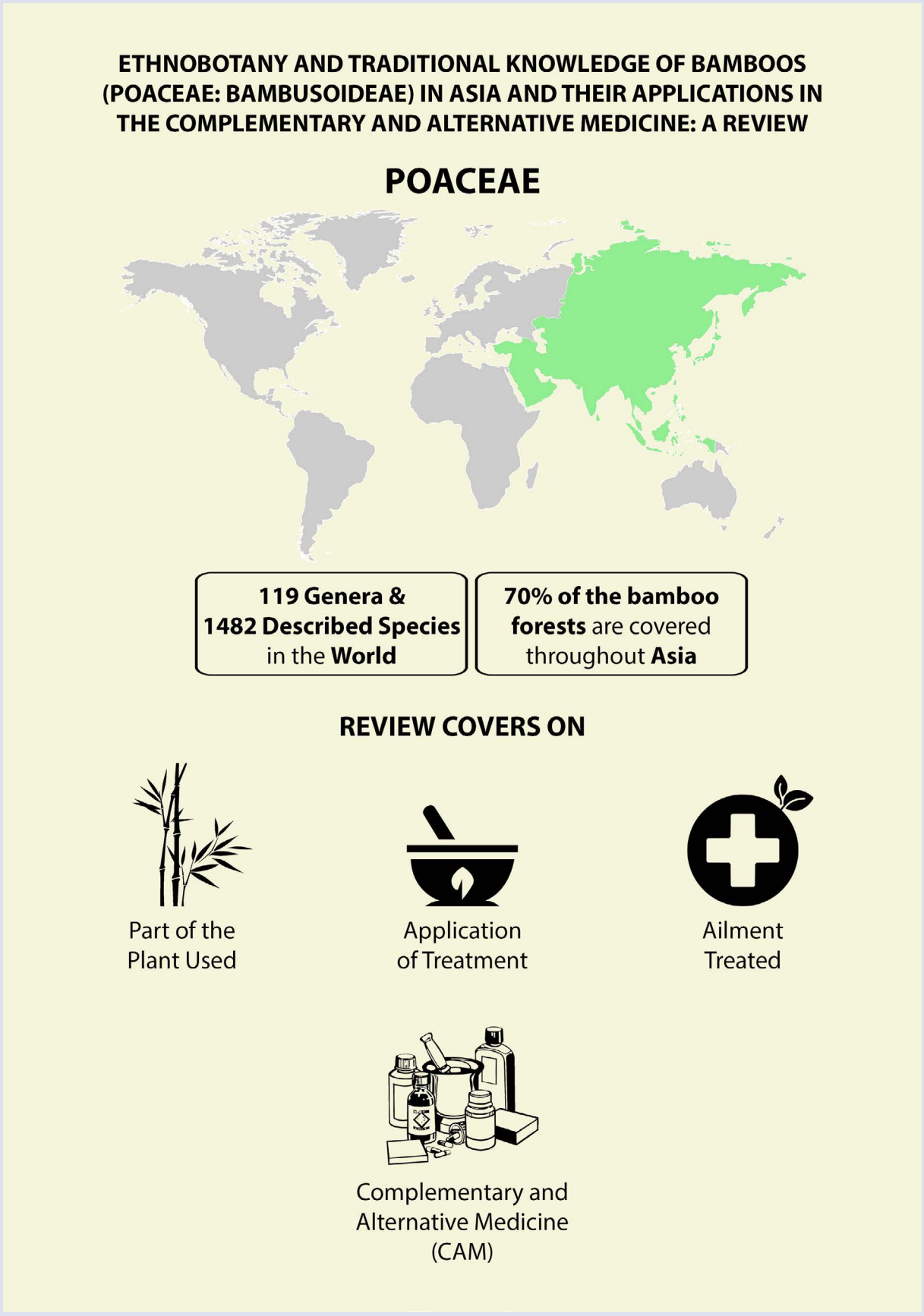
GRAPHICAL ABSTRACT



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