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Medicinal Plants of Assam, India: A Mini Review

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Abstract
Assam is a state of the North Eastern part of India. There are varieties of plants distributed in various parts of the state. 50% of India's entire plant biodiversity is contributed by the North Eastern States i.e., Manipur, Mizoram, Sikkim, Tripura including Assam. The Ministry of Environment and Forests (MoEF), Government of India in 1980s recorded two hundred and eighty six (286) species of plants from Assam, used by the tribes of Assam for treatment of forty (40) different diseases.

Key words: Assam, plant biodiversity, species, tribes, diseases.

INTRODUCTION

Most of the medicinal plants used by local people and tribes of the state of Assam are indigenous and are not known to the vast world of phytochemical science and research. The active ingredients and potent phytochemicals with promising pharmacological properties present in those plants are yet to be explored. May be some life saving miracle drug formulation can be discovered from one or some of those indigenous plants of Assam which are being used with trust and confidence by thousands of people, the tribal and the villagers residing in Assam and can be a landmark in the world of pharmaceutical sciences and a blessing to mankind all over the globe[1-3].

Assam - The Peerless

The name of the state Assam owes its origin from the Sanskrit word 'Asom' which means 'unparallel' or 'peerless' [4]. In other opinions, Assam derives its name from the name of the 'Ahoms' – who ruled the state for six hundred long years till the British came to India[5]. Geographical location of the state of Assam is the North Eastern part of India. Bhutan and Arunachal Pradesh lies in the North of Assam; Mizoram and Tripira lies in the south of the state of Assam; Nagaland and Manipur lies in the East and West of Assam is bordered by Bangladesh and the states of Meghalaya and West Bengal[6]. Shape of the state of Assam is 'Y'. Among the three major physical regions of Assam, the Brahmaputra river valley is the largest. The other two physical regions of Assam are the Barak River valley in the south, and the hilly region between Meghalaya (to the west) and Nagaland and Manipur (to the east). The State of Assam has diverse topology. It has riverside and hills and valleys. The diverse topology of the State provides platform for diverse biodiversity of Assam[6]. The climate of Assam is primarily hot and humid with sufficient precipitation round the year. Main profession of people of the state of Assam is agriculture (Fig.1.). The principal food crop is rice and the principal cash crop includes tea, jute, cotton etc. Major fruits found growing in the state of Assam are orange, mango, guava, banana, jackfruit, pineapple etc. Assam is well known for sericulture. Exclusive varieties of silk i.e., Endi**,** Muga**,** Tassar, etc. are produced by Assam. Muga silk is produced only by Assam in the world. Dispur is the capital city of Assam[5]. Assam has several wild life sanctuaries. Presently there are eighteen wild life sanctuaries in the state of Assam. Amchang Wild Life Sanctuary, Barnadi Wild Life Sanctuary, Hollongapar Gibbon Wild Life Sanctuary, Nambor Wild Life Sanctuary, Porbitora Wild Life Sanctuary, Sonai Rupai Wild Life Sanctuary, Pani-Dihing Bird Wild Life Sanctuary, Barail Wild Life Sanctuary are some of the wild life sanctuaries of Assam[7]. Kaziranga National Park in Assam is a world heritage. It is a home for one horned rhinoceros, wild water Buffalo, swamp deer and various species of birds. Kaziranga has been declared as tiger reserve and has the world's largest reserve of tigers among all protected forests[8]. Kaziranga has two third of the world's total population

of single horned rhinoceros. The count of the world famous single horned rhino (*Rhinoceros unicornis*) has risen according to the latest census held in 2015. The forest department of the Government of Assam in association with several wildlife NGOs performed the census and the number of the one horned rhino population has increased to over 2,400 in the Kaziranga Nationa Park, Assam[9].

Fig.1. Agricultural land in Chiring Chapori, Dibrugarh, Assam"

Climate of Assam

The climate of Assam is sub-tropical monsoon type. The diurnal temperature in summer is 35°C on an average and that in winter is 25 °C. The night temperature falls to a minimum of 10 °C. The hot rainy season lasts from May to October and dry climate persists in Assam from November to April. Overall the climate is humid and rainfall occurs round the year with varied distribution[10]. Days remain sunny normally if not during the monsoon. Rainfall is sudden and can occur at any time of the year

Plant Biodiversity of Assam

India is considered one of the seventeen 'megabiodiverse countries' around the world . Assam is a part of the Eastern Himalayan Biodiversity of India and is one among the twenty five 'megabiodiverse' regions of Earth[4]. The state of Assam is of 78,438 km² area[5] of which 35.48% is forest[11]. The plant biodiversity of the state of Assam is vast, rich and spectacular. The forest in Assam can be classified as Tropical Wet Evergreen Forests, Tropical Semi Evergreen Forests, Tropical Moist Deciduous Forests, Sub-tropical Broadleaf Hill Forests, Sub-tropical Pine Forests, Littoral and Swamp Forests, Grassland and Savannahs. Tropical Wet Evergreen Forests are distributed in the districts of Golaghat, Jorhat, Sibsagar, Tinsukia, Dibrugarh etc. The tallest tree of Assam Hollong (*Dipterocarpus macrocarpus*) also known as the 'State Tree' is found in these forests. Tropical Wet Evergreen Forests are also found in the Southern part of Assam. Canes and bamboos grow at the edges of those forests. There is abundance of shrubs and herbs along with tall trees in those forests. Tropical Semi Evergreen Forests are found primarily in Hallangapar, , Kakoi, Nauduar, Batasipur, , Abhoypur, Dilli, Dhansiri, Kholahat, Mayong, Garbhanga, Rani, Mahamaya, Guma, Dohalia, Singla , Haltugaon, Kachugaon, Gali, Pobha, Ranga etc. The trees are mainly tall and medium sized with abundant occurrence of orchids and shrubs and climbers. Moist deciduous forests are distributed in the Districts of Nagaon, Morigaon, Kamrup, parts of Nalbari and Barpeta, Darrang, Dhubri, Kokrajhar and Goalpara. Sal (*Shorea robusta*) is the primary tree found .in moist deciduous forests of Assam along with other species of trees. *Terminalia* is also abundant. Dry forests are found in the Lumding, Langting etc. *Aegle marmelos* (Bel), *Albizia species* (Siris), *Melia azedarach* (Neem), *Moringa oleifera*(Sajana), etc., various species of plants are found in dry forests. In the districts of Karbi-Anglong and N. C. Hills are found the Sub-tropical Pine forests and Sub-tropical Broad Leaf Hills forests. *Alseodaphne petiolaris* (Ban-hanwalu), *Cleidon speciflorum*, *Antidesma bunius*, *Betula alnoides*, etc., are the various species found. Grass land and Savannahs constitute the vegetation in Kaziranga National Park, Orang, Sonai-Rupai, Laokhowa , Pobitora, , Barnadi, Burachapori, Dibru-Saikhowa Wildlife Sanctuaries and to some extent in Manas National Park.

Fig.2. Bamboo *(Bambusa vulgaris)* plants in Assam

Apluda mutica, Phragmatis karka, Sclerostachya fusca, Saccharum species are the Important grasses of the grasslands of Assam. Those grasses support wild life and grazers widely. Some species grow even upto 6 meters tall. Sedges and grasses form the major component of Littoral and Swamp forests. *Alpinia* species, *Amaranthus* species, *Bacopa* species, *Blumea* species, *Bombax* species, etc are the main species found[12]. Bamboo (*Bambosa Vulgaris*) plantation is also observed in various parts of Assam. The tree occurs in bushes. Young bamboo shoot is a popular ingredient for pickles among the tribes of Assam and is said to possess high nutritional value and certain medicinal properties i.e., anti hypertensive, anti hyperlipidemic and anti diabetic (Fig. 2).

Plants from Assam with Medicinal Properties

There are many plants and herbs grown in wild or some are recognised and domesticated by the natives of Assam. Those plants have outstanding medicinal uses for ages. Some are consumed in various forms as spice herb and are known for their beneficial effects in maintaining good health. Some of the common medicinal plants with their common name and medicinal application are given below in table 1.

Table 1. Some medicinal plants of Assam, their common name, compounds presnt and medicinal use

S. no.	Scientific Name	Common Name	Medicinal Use
1.	*Abelmoschus manihot*	Usipak, Aibika	Flowers used to treat chronic bronchitis and toothache[14]
2.	*Abrus precatorius*	Latumoni	Helps in hair growth, leaves are used in fever and cough & cold[15]
3.	*Desmodium laxiforum*	Bhuter chira	Leaves and stem are used to treat amenorrhoea and uterine infection[16]
4.	*Thunbergia coccinea*	Changalota,Nil-lata, Nilakontho	Root juice is used to treat stomach infection and sterility[16]
5.	*Spilenthes acmella*	Suho nibon	Leaves are used to treat mouth ulcers [17]
6.	*Colocasia esculenta*	Kola kochu	Corms and runners are consumed and are believed to treat piles and tonsilitis[17]
7.	*Alocasia macrorrhiza*	Bar-kachu	Used to treat knee joint pain and headache[18]
8.	*Enydra fluctuans*	Helechi	Leaves are used to treat ring worm[17]
9.	*Blechnum orientale*	Dhekia	Used to treat stomachache, urinary bladder infection and skin diseases[19]
10.	*Nymphoides indica*	Tal japori	The plant juice is consumed for treating jaundice[17]

There are several other plant species in Assam which are used traditionally for treating various disease conditions. Some of those plants and trees are well known around the globe for their medicinal properties and are used extensively for isolating the ative principals present in them for designing new and effective drugs with no or minimum side effects. Some such plants used by the local people and tribes of Assam are *Azadirachta indica* (Neem), *Moringa olifera* (Sajna), *Murraya koinigii* (Curry leaves), *Emblica officinalis* (Amla) etc.

Neem (*Azadirachta indica*) is used to treat several pathological conditions including infections, skin diseases and also has anticancer, antimalarial, antifungal, antiulcer, hypoglycemic activities. Leaves, twig, seeds, flower, roots, bark every part of the plant have potent medicinal use in ayurveda[20, 21]. Several compounds have been isolated from various parts of the neem plant and they are being used o formulate new drugs by researchers around the world. Neem is known to have antioxidant properties and is used in industrial manufacturing of various cosmetics, ointments other skin care products[20]. *Moringa olifera* is also extensively used in traditional medicine in Assam and other parts of North East and Eastern India. It is known as drum stick plant because of its fruits which look long like sticks and are very popular and useful vegetable in North East and East India. Leaves and flower of *Moringa olifera* are also consumed as vegetable. Compounds like zeatin, quercetin, beta-sitosterol, caffeoylquinic acid and kaempferol have been isolated from the plant. Different parts of the plant i.e., leaves, roots, seed, bark, fruit, flowers are known to have antipyretic, antiepileptic, antioxidant, antiulcerative, antidiabetic, hepatoprotective, cardioprotective , antihypertensive and many more medicinal properties[22].

Murraya koinigii i.e., curry patta is a very popular spice herb and known or its aroma. *Murraya koenigii* has hepatoprotective, cardioprotective, antioxidant, antidiabetic, anticancer, antibacterial, antiviral properties [23,24]. People of Assam, tribes and the natives use curry leaves in cooking with the concept that it keeps health good. *Murraya* also has protective effect on kidneys [24]. *Murraya* is found in almost all kitchen gardens in Assam (Fig.3.).

Fig. 3. Curry patta (*Murraya koenigii*) grown in a kitchen garden in Assam

Fig.4. Amla (*Emblica officinalis*) in a house backyard in Assam

Emblica officinalis is known as 'amlakhi' in Assamese and it has multiple medicinal uses. Most of the houses in Assam have one amla tree in the garden in the backyard (Fig.4). In Traditional medicine the fruit is used. Amla has antidiabetic, and cardioprotective activities. *Emblica* also protects eyes, helps to treat gout, respiratory problems, migraine, diarrhoea, skin problems etc. It also helps in growth of hair [25].

More Medicinal plants of Assam

Most of the plants with medicinal properties found in various parts of the state of assam belong to the families of Malvaceae, Papilionaceae, Sterculiaceae, Mimosaceae, Amaranthaceae, Rutaceae etc. Some more medicinal plants found in Assam are *Ajuga bracteosa, Abutilon indicum, Acarus calamus, Adiantum capillus-veneris, Bridelia Montana, Byttneria grandiflora,*

Baliospurmum montanum, Callicarpa longifolia, Chenopodium album, Cissampelos pareira, Clerodendrum colebrookianum, Crotalaria albida, Cuscuta reflexa, Desmodium gangeticum, Datura stramonium, Enhydra fluctuans, Euryale ferox, Flemingia strobilifera, Glycosmis pentaphylla, Leea indica, Knema angustifolia, Leucas linifolia, Lycopodium clavatum, Mimusops elengi, Momordica dioica, Mucuna prurita, Melia azedarach, 0lax acuminate, Phlogocanthus thyrsiflorus, Piper nigram, Pithecellobium monadelphum, Plumbago zeylenica, Spilanthus acmella, Sida rhombifolia, Solanum zanthocarpum, Stephania hernandifolia, Viburnum colebrookianum, Vitis latifoliavina rosea, Wrightia tomentosa, Xanthozylum nitidum, Ziziphus mauritiana, Xanthozylum budrunga, Wrightia tomentosa, Verbena officinalis, Tinospora cordifolia, Thevetia peruviana, Vinca rosea, Trichossanthes palmata , Xanthozylum alatum , Typhonium trilobatum, Rauvolfia tetraphylla, Rubia cordifolia , Rumex nepalensis , Randia dumetorum, Polygonum micrpcephallum, Pogostemon parviflora , Pueraria tuberosa etc., etc.

There are some hundreds known and unknown plants and herbs in Assam with medicinal use for years. Most of the houses in the villages and towns in Assam have a small garden with varieties of herbs and plants known for their medicinal use in the region (Fig.5.).

Fig.5. Different types of plants with known medicinal use grown in a garden in a house in Assam

CONCLUSION

Assam has a rich reserve of varieties of medicinal plants and herbs. Most of those plants and their medicinal application are known only to the natives and the tribes residing in various parts of Assam for ages. Most of those medicinal plants have not yet been explored experimentally. The active ingredients present in these plants of the state of Assam may be used for designing some new durgs and pharmaceutical agents which can pave some new alleys in the world of pharmaceutical sciences and be a blessing for mankind. Plant derived pharmaceutical formulations used to treat diseases are termed as alternative medicine. Alternative medicine is better than our conventional allopathic medication and can enhance impact of conventional drugs if used properly along with them. Nature derived, phytochemicals those constitute alternative drugs do not have any side effects reported till date if used in a specific dose. Though there have been some studies on these medicinal plants of the state of Assam, and some databases of the plants have been created, yet, finger pringting and isolation of the active principles and the medicinally potent phytochemicals from these plants needs to be performed. Some o the medicinal plants work miraculously in certain diseased conditions according to the tribal people of Assam. May be while hunting for drugs in laboratories for certain deadly diseases day and night, researchers and scientists are missing some miraculous and potent phytochemical constituents which could be modified for formulating the drug, which are present in the plants grown in wild and ignorance on the road side, backyards and valleys of Assam. Extensive experimental indulgence is essential for exploring the indigenous medicinal plants of the state of Assam and for fingerprinting their phytoconstitutents for steps ahead in modern pharmaceutical research and sciences.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

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