

## Medicinal and Aromatic Plants of Commercial Importance from Northeast India

The Northeast India is part of Indo-Burma biodiversity hot-spot and is a home for large number of Medicinal and Aromatic plants (MAPs) of economic importance. The vast resource of MAPs in NER presents endless opportunities for establishing enterprises for addressing livelihood issue the growing demand for herbal-based environmentally friendly products. Considering the increase in demand of herbal products in recent times, NER can take advantage of production of raw/semi processed material of highly valuable MAPs for building rural economy. This review summarizes the potential of some of the highly valuable MAPs to enhance rural economy in NER.

**M**EDICINAL and Aromatic Plants (MAPs) have been utilized in various forms by the mankind and have been deeply rooted with human civilization since antiquity. MAPs have widespread curative, cultural, and culinary uses and also extensively consumed as food supplements, feed additives and as starting and/or model materials for pharmaceutical research and medicine production. MAPs are a vital resource for enterprise development and livelihood generation. Starting from the collection of plants from the wild to the farming, processing, marketing, value addition, manufacturing, drug development and capacity building forms the basis for an exclusive enterprise in this sector.

### *Alpinia galanga*

**Presence in NER:** *Alpinia galanga* (L.) Willd (Greater galangal/ Kulanjan), family Zingiberaceae is widely available in different parts of Northeast India. It is known by various names in vernacular languages viz Assamese (Bogi-tora/ Tora-bhaghini), Mizo (Ai-chal) and Manipuri (Kang-hu, Hirui).

**Plant description:** The plant is a perennial herb which grows up to the height of 1.5-2.5 m with slightly aromatic rhizomatous root. The rhizome which is the economical part of the plant, its size ranges from 3.5-7.5 cm in length, and seldom more than 2 cm thick. Their

odour is aromatic, pungent, spicy and bitter.

**Relevance in ethno and modern medicine:** The rhizome of this plant are used in Ayurvedic system of Medicine to improve appetite, taste and voice. It is also useful in vata, bronchitis and diseases of the heart. In Unani system, rhizomes have been used as stomachic, aphrodisiac, tonic, diuretic, expectorant, carminative; useful in headache, rheumatic pains, sore throat, sour eructation, stuttering, pain in chest, diabetes, burning of the liver, tubercular glands and diseases of the kidney. It is used to treat several diseases, including microbial infections, inflammations, rheumatic pains, chest pain, dyspepsia, fever, burning of the liver, kidney disease, tumours, diabetes and even HIV. In some districts of Nagaland it is used for management of cold and sore throats. The plant is commonly used by the people of Manipur for regulating blood circulation, anthelmintic or vermifuge, antipyretic, expectorant and work against cold. Galangal rhizome can also be used as a substitute for antibiotics, disinfectants, and food seasonings.

**Relevance in food and culinary practises:** All parts of galangal are used as an ingredient in food. It is use to add flavour and spice to the cuisine. The flowers can be used as a seasoning or as the main constituent in soups, salads, sweet dishes, main courses, and drinks. They are also used for making traditional meat cuisine.



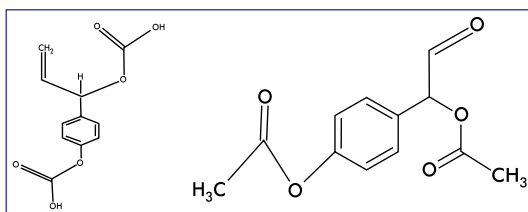
Plant in vegetative growth



Rhizomes



Flower



Galangal acetate

1'S-1'-acetoxyeugenol acetate

*Alpinia galanga*

**Industrial relevance:** Galangal acetate (1,2-acetoxy-chavicol acetate) has been reported as the main pungent principle in the rhizome. It has capsaicin like pungency which makes the plant an important ingredient for flavour related sensation in many types of food, beverages, and personal care products.

**Trade:** It is reported that its market demand is above 100 MT per year. In the world the global supplier of *Alpinia galangal* are India, Thailand, Vietnam, and South Africa. The major buyers are Russia, South Korea, Ukraine and United States. The rhizome cost ₹ 260-270 per kg in the Indian market.

**Major phytochemicals:** Galangal acetate, phenylpropanoids and phydroxybenzaldehyde (1'S-1'- acetoxy-chavicol acetate and 1'S-1'-acetoxyeugenol acetate), acetoxycineoles (trans and cis)-2-and 3-acetoxy- 1, 1, 8-cineoles,  $\beta$ -Sitosterol diglucoside (AG-7) and  $\beta$ -sitosteryl Arabinoside (AG-8), hydroxy-1,8-cineole glucopyranosides, (1R, 2R, 4S)-and (1S, 2S, 4R)-trans-2-hydroxy-1,8-cineole  $\beta$ -D-glucopyranoside, and (1R, 3S, 4S)- trans-3-hydroxy-1, 8- cineole  $\beta$ -D-glucopyranoside.

### *Centella asiatica*

**Presence in NER:** *Centella asiatica* Linn. is available in most part of the NER and known by various vernacular names in different states viz. Tripura (Samsota-Kokborok), Meghalaya (Bat syiar/ Khlieng syiar-Khasi, Mese nachil-Garo, Sla takheh-Jaintia), Manipur (Peruk-Meitei), Mizoram (Lambak), Assam (Manimuni) and Nagaland (Gara-Angami, Sano rukho-Lotha).

**Plant description:** The plant is a perennial, prostrate herb that can grow up to 15 cm tall. The stem is glabrous, and the leaves are orbicular-renniform, 1.5-5 cm wide and 2-6 cm long, 1-3 from each node of the stem, sheathing the leaf base, crenate margins, and glabrous on both sides. The aerial parts as well as the whole plants have medicinal, culinary and other industrial value.

**Relevance in ethno and modern medicine:** *C. asiatica* is widely utilised in NER in traditional medicine for the management of minor wounds, eczema, ulcers, diarrhoea, measles, jaundice, asthma, toothache, small pox, and various digestive ailments based on traditional cultural practice. People of Tripura believes that consuming 2-3 leaves of *C. asiatica* on an empty stomach in the morning promotes a healthy digestive system and enhance immunity against seasonal and chronic diseases. The potential of *C. asiatica* as an alternative natural antioxidant and its protection against age-related changes in brain antioxidant defence system has been reported. Tannin and saponin from this plant have been reported to possess tumor preventing activity in animals.

**Relevance in food and culinary practises:** It is eaten as vegetable together with the main meal and consumed as herbal tea. The roots of *C. asiatica* are high in amino acids, particularly glutamate, serine, alanine, threonine, aspartate, histidine, and lysine. It is also high in vitamin A (retinol), vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin C (ascorbic acid), vitamin B5 (niacin), and carotene. High content of phenols and flavonoids in the plants could be of health importance.

**Industrial relevance:** *C. asiatica* have been used in various polyherbal formulations for commercial applications especially in hair care products. It is known to nourish the hair follicles and scalp, reduce hair loss and breakage, strengthen hair strands and promote healthy hair growth. It is used in hair colour, anti-dandruff formulations, organic shampoos, hair oils, hair gels, hair conditioners, and other hair care products. It is known for its potential to brighten and nourish the skin, reduce pigmentation, fine lines, dark circles, and provide overall skin rejuvenation. It is used in skin creams and toners, mask packs, cleansing balms, skin moisturizers, facial serums and other skincare formulations.

**Trade:** The plants holds good economic value in NER as it is sold in open markets as vegetable and can be grow easily without requiring significant investments. The total annual estimated trade of this herb in the Indian market is between 500 and 1,000 MT, under the commercial name 'Brahmi booti'. The price range of whole dried plant of *C. asiatica* is ₹ 95-100 per kg. Importers, buyers, processors, traditional practitioners, Ayurvedic and Siddha drug manufacturers are the major players in the trade of *C. asiatica*.

**Major phytochemicals:** Madecassoside, asiaticoside, madecassic acid and asiatic acid are the major phytochemicals characterized from *C. asiatica* and used of its quality assurance. plant essential oil is a colourless mild scented oil with a yield of 0.06% and is reported to contain p-cymene (44 %) by GC-MS analysis. The other phytochemicals constituents includes  $\alpha$ -copaene,  $\alpha$ -terpinene,  $\beta$ -pinene,  $\beta$ -elemene, bornyl acetate, bicycloelemene, kaempferol, quercetin, tannin, trans- $\beta$ -farnesene,  $\beta$ -caryophyllene, and germacrene-D, glutamic acid, serine, alanine, threonine, aspartic acid, histidine, lysine, centellin, asiaticin, and centellicin.

### *Curcuma angustifolia*

**Presence in NER:** *Curcuma angustifolia* Roxb. (East Indian Arrowroot or Tikhur) has been largely reported from Assam and Manipur in NER. It is known as Yaipan in Manipuri and Gorusathaladhi in Assamese.

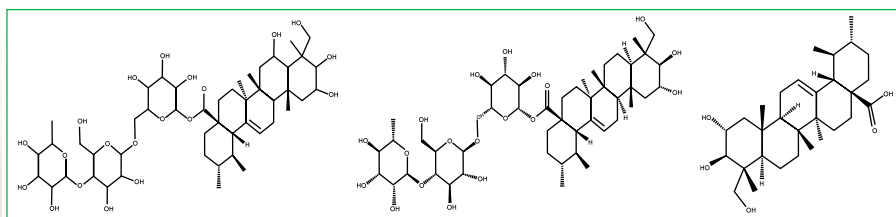
**Plant description:** *C. angustifolia* is a fast-growing



Plant in vegetative growth



Single plant

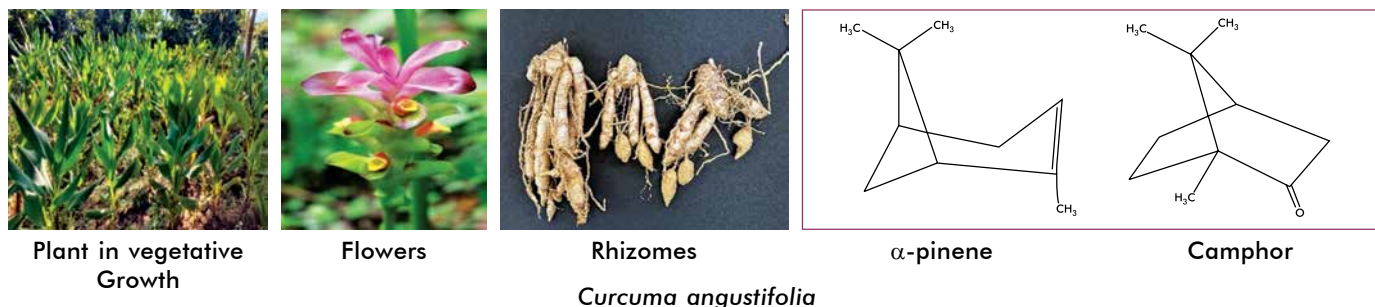


Madecassoside

Asiaticoside

Asiatic acid

*Centella asiatica*



*Curcuma angustifolia*

rhizomatous herb of family Zingiberaceae, with slender branches growing up to 90-180 cm in height, having fleshy cylindrical rhizome. Stems are usually short, replaced by pseudo stems formed by leaf sheaths, leaves are distichous with open sheaths.

**Relevance in ethno and modern medicine:** The plant is major source of starch in NER. Its starch is highly nutritious and easily digestible, therefore, it is recommended for infants, weak children and elderly people. The rhizomes extract of this plant has been reported as demulcent, antipyretic and blood coagulant in ethnomedicinal practises. Rhizomes are used in treating bone fractures, inflammation and intestinal disorders, to cure peptic ulcers, diarrhoea, colitis and also used in treatment of dysentery. It is used for treatment of chronic ailments and peptic ulcers because of its soothing effect. The powder of rhizomes with honey is applied on the mucous membrane of the oral cavity to treat ulcers. Rhizome paste is applied to cattle injured by leech.

**Relevance in food and culinary practises:** The rhizomes of the plant contain mostly carbohydrates, which are processed to obtain the commercial starch called 'tikhur'. It is processed by cutting, peeling, rubbing fresh rhizome bulbs on rough surface of stone or on sieves of rough surface, soaking with water, decanting and drying. Tikhur is used for the preparation of several foods such as barfi, halwa, khoa-jalebi and sarbat. The inflorescence and rhizomes of *C. angustifolia* are used as vegetable and flavouring agent, in Manipur the flowers are sold in the local market @ ₹100 to 200 per kg in fresh.

**Industrial relevance:** Tikhur starch is considered a superior substitute for corn starch as an excipient in tablets preparations. *C. angustifolia* starch has desirable qualities for its use in processed foods as a hydrocolloid or thickening agent. Tikhur is preferentially used in foods requiring high gel strength such as puddings, custards and jellies, which are stored for a long time. At present the market sector is dominated by the starch powder of *Maranta arundinaceae* (West Indian Arrowroot) other than corn starch, potato starch, etc.

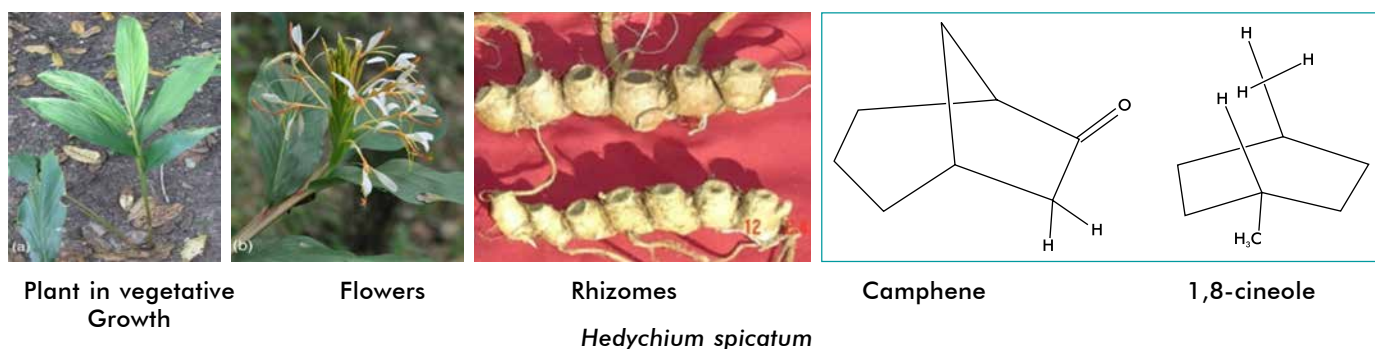
**Major phytochemicals:** Plants rhizome contains chiefly starch, sugar, fat, resins, glucose and gum. The rhizome oil is rich in A & B - pinenes, (-) ar-curcumene, Zingiberol, (+) camphor. Root contains: - D - cymarose, B -D- glucosy 1- L- thebetose, cinnamic acid & acetic acid and rhizome contains Sesquiterpenoids, curcumol, Zederone, Fyranodiene, Pyrocurzerenone, Procurcumenol, Curcumanolide A & B.

### *Hedychium spicatum*

**Presence in Northeast:** *Hedychium spicatum* Sm. in A. Rees (Spiked ginger lily/Van haldi/Kapoor kachari) is widely distributed in wild in all states of NER. The plant is known by various names in NER viz. Manipur (Takhellei, Tonruiwon), Mizoram (Aithur), Arunachal Pradesh (Papi Apu), Meghalaya (Echeng), Nagaland (Khumerh), Tripura (Khumtoya) and Assam (Katuri, Sati).

**Plant description:** The plant is a perennial rhizomatous herb, up to 1 m tall with elongate stem. The leaves are glabrous beneath and the white ascending flowers are borne in dense terminal spikes and hence the name spiked ginger lily. Rhizomes, the main economical parts of the plant are 15-20 cm long; 2.0-2.5 cm in diameter, externally yellowish-brown, but change to dark brown on storage.

**Relevance in ethno and modern medicine:** In Mizoram, rhizomes are traditionally used for management of liver related problems, pain, vomiting, stomachache, inflammation and snakebite. The rhizome is also used as expectorant, tonic, carminative and stimulant. In many districts of Nagaland, plant is used to treat diseases like fever, headache, vomiting, diarrhoea and inflammation. The rhizome paste of this plant is used around many parts of the world as a traditional remedy for abscesses. The rhizome powder (3-4 g) two times in a day is used in asthma, foul breath, bronchitis, hiccup, vomiting, tridosha and blood diseases. Rhizome powder is also used as laxative. The rhizomes powder is used as an antimicrobial agent and as a poultice for various acnes and pains. The species is also an ingredient of some traditional Chinese medicine (TCM), Tibetan medicine



*Hedychium spicatum*



*Homalomena aromatica*

and Unani medicinal system. In Ayurveda the plant rhizomes are usually consumed in powder, syrup or tablet form. The therapeutic properties of the plant are generally considered due to the presence of essential oil in the rhizomes.

**Relevance in food and culinary practises:** Considering the presence of essential oil in the rhizome the plant has served as spices for flavouring the food. In Manipur the rhizomes of this plant are smoked and used for making chutney. Beside the rhizome, the fruit of this species may be cooked and eaten with lentils in savoury dishes.

**Industrial relevance:** The plant is widely used in the pharmaceutical, cosmetics and perfumery industries. The essential oils are used in manufacturing of soap, hair oil, face powder and incense sticks and cones. 'Abir', a fragrant herbal colour powder marketed for religious ceremonies (Holi, an Indian festival of colour), is prepared from its dried rhizomes. Apart from its clinical and therapeutic uses, it is famous for its sweet-scented flowers which are used for ornamental purposes. The rhizomes are also used for providing aroma in tobacco industry.

**Trade:** Rhizomes of the species are marketed from different Himalayan regions. The rhizomes are sold out in the market as the name that of Shati/ Kapoor Kachari. It is estimated that in India, annual demand of the Kapoor kachari is approximately 400 tonnes per year with average price of ₹ 100-110 per Kg.

**Major Phytochemicals:** The essential oil (0.06 to 6.12% w/w) obtained from the rhizome of this plant having 1,8-cineole (27–75%) as the major component. Camphene, myrcene, sabinene,  $\alpha$ -pinene, and  $\alpha$ ,  $\beta$ -phellandrene were also reported from the essential oil of the rhizome in significant quality making it an important plant for healing. Other components are (E)-caryophyllene, (-) spathulenol, 1-epi-cubenol, 4-terpineol, 4-thujanol, borneol, camphene, camphor, caryophyllene oxide, cubebene, elemol, germacrene d-4-ol, hedycaryol, limonene, sabinene, spathulenol, terpine-4-ol,  $\alpha$ -cadinol,  $\alpha$ -eudesmol,  $\alpha$ -humulene,  $\alpha$ -selinene,  $\alpha$ -terpinene,  $\alpha$ -terpineol,  $\alpha$ -thujene,  $\beta$ -caryophyllene,  $\beta$ -cadinene, beudesmol,  $\beta$ -farnesene,  $\beta$ -himachalene,  $\beta$ -myrcene  $\beta$ -phellandrene,  $\gamma$ -muurolene,  $\gamma$ -cymene and  $\delta$ -cadinene have also been reported in the essential oil of the species.

#### *Homalomena aromatica*

**Presence in NER:** *Homalomena aromatica* (Spreng.) Schott is widely distributed and endemic to different part of NER. It is known by different names in different states viz., Assam (Sugandhmantri), Tripura (Kuchugundubi/ Gandhaki) and Mizoram (Anchiri).

**Plant description:** *H. aromatica* is an evergreen, perennial, terrestrial and aromatic medicinal plant which

belongs to the family Araceae. It can grow to a height of 40-45 cm with an erect and short stem. The length of the leaves is 20-35 cm and broadness of 15-25 cm with long petioles and sheathing below. The leaf blades are ovate and often cordate. The economic part of this plant is the rhizome which is known in trade as 'Sugandhmantri' and has a strong camphor like smell.

**Relevance in ethno and modern medicine:** The rhizomes possess medicinal properties like antidepressant, antiseptic, analgesic, anti-inflammatory, antispasmodic, sedative and helps in treating joint pain and skin infections. The rhizome has been used to treat asthma, cough and liver diseases. It is also used as a mosquito repellent. The rhizome paste is also used for stomach problems. The whole plant is taken to treat muscle weakness and rheumatism. The essential oil of this plant shows antifungal activities.

**Relevance in food and culinary practices:** The petiole of the plant is used as a condiment due to its pleasant aroma.

**Industrial relevance:** The aromatic rhizomes contain essential oil which is used widely in perfumery and cosmetic industry. The spent material after extraction of essential oil is largely used in the *Dhoop* industry. The presence of sesquiterpenoids in its essential oil impart a characteristic aroma and fragrance, which makes this plant highly valuable in perfume and cosmetic industry.

**Trade:** The average market price of Sugandhmantri (dried root) is ₹ 350 per kg.

**Major phytochemicals:** The essential oil of *H. aromatica* rhizome largely contains linalool, (+)- $\beta$ -Phellandrene,  $\beta$ -Pinene,  $\alpha$ -Terpineol, Sabinene,  $\delta$ -Cadinol, (-)  $\alpha$ -Cadinol, limonene, Nerol, Caryophyllene oxide, (Z)- $\beta$ -Ocimene,  $\alpha$ -Phellandrene, Aromadendrene,  $\beta$ -Caryophyllene, Cedrelanol, limonene,  $\alpha$ -Copaene, Homalomenol A, Homalomenol B, Cuminol, Bullatantriol, and Carvone, 4-terpineol.

#### SUMMARY

The MAPs bioresources have huge potential for enterprise development in Northeast Region. The rich biodiversity of the region provides a great scope for exploration, selection and breeding of elite genotypes of high demand MAPs. The commercial scale cultivation of these selected plants shall ensure availability of herbal drug raw material and also help in conservation of these plants in their natural habitats.

For further interaction, please write to:

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