

Unveiling The Economic Potential of Medicinal Plants In Arunachal Pradesh: A Blossoming Frontier

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Introduction

In the northeastern reaches of India lies a land of breathtaking beauty and cultural diversity, Arunachal Pradesh. Beyond its lush green valleys and misty mountains, this frontier state harbors a hidden treasure – its rich biodiversity of medicinal plants. As the world delves deeper into sustainable healthcare alternatives, Arunachal Pradesh emerges as a beacon of hope, offering not just remedies for ailments but also a promising economic opportunity through the cultivation and commercialization of medicinal flora.

The Green Wealth of Arunachal Pradesh

Arunachal Pradesh boasts a staggering array of medicinal plants, owing to its diverse climatic conditions and varied altitudes. From the mist-laden hills of Tawang to the verdant forests of Namdapha, the state is a botanical haven, nurturing flora with therapeutic properties.

Traditional knowledge, passed down through generations among indigenous communities, has long recognized the healing potential of these plants. But in recent times, there's been a global resurgence in interest, driven by a growing preference for natural remedies and a quest for sustainable healthcare solution.

Arunachal Pradesh is the largest state of NE India, sharing international boundaries with Bhutan, China, Tibet and Myanmar. Of the total forest area, 5.138 million ha is owned by the state and only 15,500 ha are under private ownership. Most of the diversity belongs to the state of Arunachal Pradesh, which covers most of its areas falling under tropical in foot hills adjoining to Assam and temperate and alpine areas neighbouring to China, whereas subtropical forest areas in the middle region of the state thus gives platform for high scope of medicinal plants cultivation and trade. There are over 500 species of medicinal plants reported so far from Arunachal Pradesh. Some of the most economically promising medicinal plants are *A. calamus*, *A. paniculata*, *A. malaccensis*, *Dioscorea composita*, *H. aromatica*, *O. indicum*, *R. serpentina*,



T. cordifolia, Withania somnifera, etc. in low altitudes, while for high altitudes it is Aconitum heterophyllum, C. teeta, I. griffiti, Panax pseudo-ginseng, Paris polyphylla, P. kurroa, T. baccata etc. T. baccata grows wild in moist temperate Himalayas between 1600-3600 m from sea level altitudes. In Arunachal Pradesh, it is found in the shady and humid tracts of Tawang district above 1800 m from sea level. O. indicum is locally known as Panokni or Bhatghila in Arunachal Pradesh is abundantly found in the foothills of Papumpare, East Siang, West Siang, East Kameng, West Kameng, Changlang, Tirap, Lohit and Lower Dibang Valley of Arunachal Pradesh. C. teeta locally known as Mishmi teeta, is a perennial herbaceous medicinal plant which is native to Arunachal Pradesh (Mishmi Hills), Sikkim and Bhutan. It is cultivated in a small scale in Arunachal Pradesh and China (Yunnan). As it is a climate and region-specific crop, Department of Environment and Forest, Arunachal Pradesh, has taken up the responsibility of cultivation of this plant in small areas of Dibang Valley and Lohit districts. It grows at the elevation height of 1700 - 2800 m, I. griffithii (Munsheng or Monpa) is found in open and shady areas in hill slopes of moist temperate forests within 1600-2500 m altitudes of West Kameng and Tawang in Arunachal Pradesh. Dried seed and fruits/pods are the economically valuable parts of I. griffithii. Shikimic acid is used as a substrate for industrial synthesis of Tamiflu (inhibitor of human influenza virus H1N1). Majority of the world supply of this compound comes from isolating it from the Chinese star anise (Illicium spp.) making it highly lucrative for pharmaceutical industry.

Tapping into Economic Opportunities

The economic scope of medicinal plants in Arunachal Pradesh is vast and multifaceted:

- 1. Cultivation and Harvesting:** With the right interventions and support, Arunachal Pradesh can become a hub for the cultivation and sustainable harvesting of medicinal plants. This not only generates income for local communities but also preserves the fragile ecosystem by promoting regulated harvesting practices.
- 2. Value Addition and Processing:** Processing raw plant material into value-added products such as herbal extracts, essential oils, and dietary supplements adds significant value to the medicinal plants. Establishing processing units within the state not only creates employment opportunities but also enhances the marketability of these products.



3. **Research and Development:** Investing in research and development facilitates the identification of new medicinal species, extraction techniques, and formulations. Collaborations between scientific institutions, local communities, and the government can lead to breakthroughs in plant-based medicine, driving innovation and attracting investments.
4. **Tourism and Ecotourism:** Arunachal Pradesh's natural beauty and biodiversity are a magnet for eco-tourists and wellness enthusiasts. Developing eco-tourism circuits centered around medicinal plant reserves not only promotes sustainable tourism but also creates avenues for community engagement and income generation.

Superior quality attributes of medicinal plants of NER

Plants have a plethora of phytoconstituents that add to their bioactivity and highlight their premium attributes. However, the bioactivity of the plants is highly variable and depends on parameters like time of collection (day, season etc.), types of growth origin (wild or cultivated), harvesting & post harvesting techniques and region (arid, marshy, tropical etc.). As most of the available medicinal plants of NER are either grown in wild or organic cultivation, the quality attributes are found to be much higher than other counterparts. Its high endemism in many medicinal plants like *C. teeta*, *I. griffithii*, *H. kurzii*, *M. pruriens*, *P. longum*, *S. chiratya*, *T. baccata* also enhances its super quality traits. The bioactive secondary metabolites are found to be enhanced in plants in their natural habitat under particular conditions of stress, competition, association, threat of predators and adverse climate etc. The Lakadong variety of turmeric originating from the Jaintia hills district of Meghalaya (Lakadong Village) is considered to be one of the world's best varieties of turmeric with its curcumin content of about 6.8-7.5% and volatile essential oil (dry) of about 3.6- 4.8%. Naga King chilli is considered the world's hottest chilli with a "Guinness Book of world records" (measuring 8,55,000 Scoville heat units), outscoring the "Mexican red savana habaneros" (5, 77,000SHU). The Nagaland Government also got the patent rights of Naga King Chilli and got Geographical Indication (GI) tag under the Registration and Protection Act, 1999. Karbi Anglong district of Assam produces one of the best organic gingers in the world. The ginger grown in this region has low fibre. Varieties of ginger such as Nadia and Aizawl, having dry rhizomes and high recovery of oleoresin in oil, are in demand among domestic buyers and exporters. *R. serpentina* collected from this region is found to contain a much higher percentage of alkaloids than in other parts of the country.

Market scenario of medicinal plants

National herbal market scenario

As it is not recorded or is poorly classified, it is difficult to assess the volume of trade of medicinal plants business accurately. The first attempt to assess the nationwide annual demand and supply of medicinal plants was made by the NMPB during 2001-02, when it commissioned a study through the Centre for Research, Planning and Action, Delhi (CERPA). This was followed by studies conducted by the FRLHT, Bangalore, again commissioned by NMPB during 2006-07. The consolidated commercial demand for herbal raw drugs during the year 2014-15 has been estimated at 5, 12,000 MT. Isabgol (*Plantago ovata*), Chakoda/ Powad Beej (*Senna tora*) and Sonpatta (*Senna alexandrina*) were recorded as the top three exported botanical drugs with export volumes of more than 32,000 MT, 28,000 MT and 13,000 MT respectively during the year 2014-15 MT. Other than this opium alkaloids, Vinca extract, cinchona alkaloids, menthol, gudmar herb, mehndi leaves etc. are major pharmaceutical exported items from India⁶⁸. Apart from the requirements of medicinal plants for internal consumption, India exports crude drugs mainly to developed countries, viz. USA, Germany, France, Switzerland, the UK and Japan, share between them 75 to 80 per cent of the total export of crude drugs from India. About 1178 medicinal plant species are recorded in the practices of trade both in national and international markets. Out of which, 242 plant species are used more than 100 MT annually. These are estimated to cover 7, 800 herbal products manufacturing units in India licensed to manufacture ASU and Homoeopathic formulations. In respect of botanical drugs consumed by the domestic herbal industry, *A. vera*, with an annual estimated consumption of 15,700 MT (DW) emerged as the entity in highest consumption, replacing *E. officinalis*. Medicinal plants are traded both as raw herbage or crude drug and processed products. Herbal products are nowadays classified as traditional and conventional herbal medicinal products, fortified foods, dietary supplements, foodstuffs and cosmetics. Crude drugs are used in pharmaceutical companies for isolation of single purified drugs, development of advanced plant extract or as a starting material for the production of other semi-synthetic pharmacologically active substances.

NER herbal market scenario

The medicinal plant sector has great potential to boost the economy of NE India. Wild bioresources are indispensable for the survival and sustenance of ethnic and rural communities,

of Northeast India. A recent report observed that the trade of wild bio resources contributes 5–75% to the total income of a majority of the households of Assam. At present, the plant raw materials from the region is traded mainly in the markets of Delhi, West Bengal, and Bihar as there is no mandi system in NER. Most of the herbal raw material is collected directly from the wild and not from cultivated sources. As there is no open market for herbal raw materials in this region, the middlemen take it directly with approval from Divisional Forests Officers and sell it to open markets in other parts of the country. The farmers of this region are also not properly availing of NMPB facilities/mandates, as they usually have less than the specified minimum requirement of land. Currently, State Forests Department is allowing direct purchases of these raw materials as non-timber forest products (NTFPs) or Minor Forest Produce (MFP), which include all biological materials other than timber extracted from natural forests for human use. Except for Assam with only four licensed herbal units, none of the North Eastern states have any licensed herbal units for processing of available medicinal plants. North East India holds a dominant position in the ginger (*Z. officinale*) economy of the country and spices having numerous medicinal properties like large cardamom, turmeric, bay leaf, black pepper, chilli etc. have been showing an increase in demand. In this direction, North Eastern Regional Agriculture Marketing Corporation Limited (NERAMAC) under the Ministry of Development of North Eastern Region (DoNER) also has been playing a major role by sourcing, procuring and marketing these products including other cash crops from the farmers and the growers of the region.

Constraints to the development of trade in medicinal plants in NER

Harsh geographic terrain and the resulting difficulty in building infrastructure have kept the NE region underdeveloped, making any economic activity very difficult to accomplish. Due to this and other factors like land holding pattern, social unrest, tribal laws; landlocked NE India has remained somewhat inaccessible for trade and economics. Most of the raw materials are collected directly from the wild and not from cultivated land, and often by untrained farmers. Collections of plants from the wild were often plagued by adulterations either intentionally or unintentionally (substitution) leading to species substitution and adulterations. These are sold directly to the middlemen or traders due to the absence of any “Herbal Mandis” in the region. This makes the whole process highly secretive and unorganised. Among the few cultivated medicinal plants, farmers/growers often do not follow Good



Agricultural Practices (GAP) to provide good quality raw materials. Subsequently, improper Good Post Harvesting methods (GHP) lower the quality of herbal products. Above mentioned and many others are a few issues which pose bottlenecks in the proper trade of medicinal plants in the region.

Conclusion:

Arunachal Pradesh stands at the cusp of a botanical renaissance, poised to harness the economic potential of its medicinal plants. By fostering collaboration between stakeholders, leveraging traditional wisdom, and embracing innovation, the state can not only improve healthcare access but also carve a niche for itself in the global herbal medicine market. As we tread towards a greener and healthier future, Arunachal Pradesh shines as a beacon of sustainable development, rooted in nature's pharmacy.

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