

## **MEDICINAL PLANTS OF DARJEELING HIMALAYAS: AN ECONOMIC ASPECT**

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The global attitude of turning to the nature for its valuable resources especially for newer drugs has continuously been a threat to the current development of science and technology based industries. The rising costs of patented drugs and the development of drug resistance in many pathogens have forced the medical science to look back for alternatives in nature. On the other hand, the natural plant products are biologically more compatible with the human system and comparatively less toxic than the synthetic products and economically beneficial for the people especially in third world countries.

Most of the drugs curing human ailments in India are of plant origin but the number is not very large when compared to country's area wise variety of plant wealth (Jain 1968, 2000). According to the record of World Health Organization, 80% of the rural population in developing countries are still utilizing the locally available medicinal plants for their primary health care needs. About 8,000 species of medicinal plants are reported so far for the treatment of various ailments and about 90% of the medicinal plants are found in the forest while 10% are found in the landscapes like open grassland, agricultural pastures and fresh water. There are 40,000 herbal formulations in the world today and 90% of medicinal plants consumed domestically and exported are collected from the wild while only 70 out of around 700 species in the trade are obtained purely from cultivated sources.

Himalayas are regarded traditionally as the secret haven of many life saving medicinal plants in the Ramayana, Vedās, Samhitas and various folklores of the ethnic people of Himalayan region. Darjeeling Himalayan region, sandwiched by the Nepal Himalaya in the west and Bhutan in the east and the sub Himalayan region of Sikkim in the north and Terai and plains in the south, has its own place in the vegetation map of the country.

Within a small geographical area of 3,254.7 sq.km there is a wide altitudinal variation ranging from 167m (at Sukna) to 3,636m (at Sandakphu). Because of the suitability of location and climatic condition the commercial cultivation of exotic medicinal plants are in existence since 1,861 when Sir Thomas Anderson brought the seeds of *Cinchona* in this region (Biswas and Chopra, 1956). At present the *Cinchona* plantation covers more than 26,000 acres of land in the sub Himalayan region of Darjeeling district under the Directorate of *Cinchona* and other Medicinal plants, an enterprise of the Government of West Bengal. The medicinal plants like *Cephaelis ipecacuanha*, *Cinchona ledgeriana*, *Cinchona succirubra*, *Dioscorea composita*, *Dioscorea prazeri* and *Dioscorea floribunda* are being successfully cultivated there. However, sufficient knowledge on the cultivation of indigenous medicinal plants is till lacking. There are a large number of high value medicinal plants on which the local people and the practitioners of different traditional systems of medicine have shown their trust, but they are yet to be scientifically studied. Besides their preference as natural remedies there is a great demand of plant products in the food industry, pharmaceutical, nutraceutical and perfume industries.

The present study was made by survey work on all parts of the region - forests, villages and other thrust areas. These areas were visited regularly for observations and development of understanding and relations with local people, so that they feel free to divulge their long protected traditional knowledge. Herbal practitioners from this region like Jhankri, Bijuwa, Bongthing, Phedangwa and Lama were interviewed regularly and the plants in question were identified with their help and also with the help of experienced village folks (Rai & Bhujel 2002). Specimens were properly recorded in the field note book, processed and mounted in the herbarium sheets (following Jain & Rao, 1976), identified using literature, matched at NBU-herbarium and at BSI, Gangtok and finally deposited in the herbarium of the Department of Botany, Kalimpong College. Market survey was done at all the major township and haats of the hill areas and enquiries were made from vendors selling local herbs or herbal parts.

The enumeration of the collected specimens having market potentials has been made alphabetically according to their altitude of occurrence.

**1. Medicinal plants of temperate-sub alpine regions (1850-3636m)**

*Astilbe rivularis* D. Don

*Aconitum bisma* (Buch-Ham) Rapaics

*Aconitum spicatum* (Haworth) Stenberg

*Campylandra aurantiaca* Baker

*Dactylorhiza hatagirea* (D. Don) Soo

*Heracleum nepalense* D. Don

*Heracleum wallichii* DC.

*Lycopodium japonicum* Thunb

*Mahonia napaulensis* DC

*Nardostachys jatamansi* DC.

*Neopicrorhiza scrophulariiflora* (Pennel) D.Y. Hong

*Panax pseudoginseng* Wall. var. *angustifolius* (Burkill) Li

*Panax pseudoginseng* Wall. subsp. *himalaicus* Hara

*Panax pseudoginseng* Wall. var. *bipinnatifidus* (Seeman) Li

*Pentapanax fragrans* (D. Don) Ha

*Podophyllum sikkimense* Chatterjee & Mukherjee

*Rheum acuminatum* Hook. f.

*Rubia manjith* Roxb. ex Fleming

*Swertia chirayita* (Roxb. ex Fleming) Karsten

*Taxus baccata* L. subsp. *wallichiana* Zucc.

*Tupistra nutans* Wall. ex Lindl.

*Zanthoxylum acanthopodium* DC.

**2. Medicinal plants of sub tropical- sub temperature regions (1200-1850m)**

*Begonia picta* D. Don

*Docynia indica* (Wall.) Decaisne

*Elaeocarpus lanceifolius* Roxb.

*Fraxinus floribunda* Wall.

*Girardinia diversifolia* (Link.) Friis

*Laportea terminalis* Wight

*Litsea cubeba* (Lour.) Persoon



*Phytolacca acinosa* Roxb.

*Tetradium fraxinifolium* (Hook.) T.G. Hartley

*Tricosanthes lepiniana* (Naudin) Cogniaux

*Urtica dioica* L.

### **3. Medicinal plants of sub tropical – tropical regions (150-1200m)**

*Acorus calamus* L.

*Acacia catechu* (L.f) Willd

*Aloe vera* (L.) Burm.f.

*Andrographis paniculata* (Burm.f.) Wall. ex Nees

*Asparagus racemosus* Willd.

*Azadirachta indica* A. Jussieu

*Cassia fistula* L.

*Centella asiatica* (L.) Urban

*Datura metel* L

*Entada rheedii* Sprengel

*Gynocardia odorata* R.Brown

*Holarrhena pubescens* (Buch-Ham.) Wall. ex G.Don

*Horsfieldia kingii* (Hook.f) Warbury

*Justicia adhotada* L.

*Oroxylum indicum* (L.) Vent.

*Phlogacanthus thyrsiformis* (Roxb. ex Hardwick) D.J. Mabberley

*Phyllanthus emblica* L.

*Piper longum* L.

*Rauvolfia serpentina* Bentham ex Kurz

*Rhus chinensis* Miller

*Stephania globra* (Roxb.) Miers.

*Stephania japonica* (Thunb.) Miers.

*Terminalia belerica* (Gaertner) Roxb.

*Terminalia chebula* Retzius

*Woodfordia fruticosa* (L.) Kurz.

*Zanthoxylum nitidum* (Roxb.) DC.

– Darjeeling Himalayan region harbours one of the richest flora of medicinal and other importance because of its great diversities in physiographic, climatic and edaphic conditions. However, an integrated and scientific approach for the commercial exploitation of indigenous medicinal plants has never been taken so far. The plant based major pharmaceutical industries of the country have not been able to get their quantity of raw material from this region. Moreover, the stable but sluggish economy generated by the tea and cinchona plantation has not been able to sustain the livelihood and improve the quality of life. The cultivation of some of the above mentioned plants could enhance the livelihood of local people by generating income through large scale production of Non Timber Forest Products. Plant parts or produce from a cultivated field could sustain and upgrade livelihood by enhancing regular income (Rai & Bhujel 1997). At present, the region does not have a developed mechanism to make these plant products directly available to the target clients except through some middleman in Siliguri and Kolkota where the products are being sold at throwaway prices.

Demand of plant based medicine, health products, food supplements and cosmetics is growing in international market. Current level of Indian share on international trade of medicinal plants is reported to be US. \$ 800 million and the rate is growing every year. In terms of value and value of medicinal plants exported, India ranks second in the world. India supplies 12% of world's requirement of medicinal plants to the countries like UK, USA, Germany, Japan and Switzerland. Commercial approach on the production of medicine based on local herbs has never been taken so far and hence there is no organised market for the local medicinal plants. Only a few drug vendors selling dried parts of medicinal herbs are seen in the streets of Indian towns. Different institutions and private establishments such as Department of Forest, Department of Agriculture, Directorate of cinchona and other medicinal plants, Research laboratories, Pharmaceutical industries, herbal practitioners and NGOs can take part in the domestication and multiplication of these medicinal plants. The venture of opening *in situ* & *ex situ* gene bank is already a well known practice in the country. Darjeeling Himalayan region could be one of the ideal resorts for such banks and could preserve the threatened medicinal plants for posterity and also multiply the same to meet the demands of the cultivators and the industry.

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