Guidelines for Transfer of Technology

Cultivation and Marketing of Agri-Horticultural Crops, Dairy Husbandry and Post Harvest Technology

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Genetic Resources, Cultivation and Marketing of Medicinal Plants in Darjeeling Hills

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Introduction

The eastern Himalayan range, enjoys the dignity of being blessed with ideal climatic and edaphic factors, which favour and add richness to the vegetation of the region. As declared by the International Union for Conservation of Nature (IUCN) the region is one of the 18 hotspot zones of the world and again one of the only two falling in India. The Darjeeling-Sikkim region is the integral part of this zone and its significance in the richness of flora and vegetation is unquestionable.

Floristic Resources

Altitudinally, the floristic stretch in the region range from as low as 140 m in the plains of Siliguri to as high as 5000 m beyond which the permanent snow zone prevails. The Darjeeling-Sikkim Himalaya harbours one of the richest biodiversity in the world. The existing record shows the presence of more than 4000 plants alone. There are six vegetational zones of the following categories:

(1) The plain and tropical vegetation: characterized by Terminalia-Albizia-Cassia combination.

(2) The subtropical vegetation: characterized by Callicarpa-Castanopsis-Schima-Shorea combination.

(3) The sub temperate vegetation: characterized by Daphne sureil-Edgeworthia-Maes-Macaranga combination.

(4) The temperate vegetation: the major asset of the region characterized by Acer-Elaeocarpus-Michelia-Rhododendron-Castanopsis combination.

(6) Alpine vegetation: characterized by *Juniperus-Rhododendron* and grassland species.

The region harbours cosmopolitan, Himalayan, exotic and a significant number of endemic elements. There are a large number of endangered plants of botanical value. Along with these, the region is having a large number of high value medicinal plants.

**Medicinal plant resources**

The World Health Organisation (WHO) in its report has shown that the 80% of the rural population in the developing countries are still using locally available medicinal plants for their primary health care. In the Indian scenario 8000 plant species have been reported to be used as medicines, 90% of these species are collected from the wild conditions and the remaining 10% from other landscapes. There are 700 species of medicinal plants in the trade of which a meagre figure of 70 species are obtained from cultivated sources.

More than 400 species of medicinal plants have already been recorded from this part of the Himalaya while further works in this line will explore and record more such species in the list. The report of the WHO is truly reflected in the rural and fringe areas of this region also where aboriginal inhabitants of different races are dependent on herbal drugs. This has become one of the factors influencing the entry of local plants into the market and trade in the region. As a consequence and due to various reasons of use and exploitation the wild plants or plant parts are available in the local market in the region.

The following plants (arranged altitudinally) are available in the local market of the Darjeeling-Sikkim Himalaya:

1. Medicinal plants of temperate-sub alpine regions (1850-3636 m):
   
   (i) *Aconitum bisma* (Buch-Ham.) Rapaiics
   
   (ii) *Aconitum spicatum* (Bruhl.) Stapf
   
   (iii) *Campylandra aurantiaca* Baker
   
   (iv) *Dactylorhiza hatagirea* (D. Don) Soo
   
   (v) *Dicentra scandens* (D. Don) Walpers
   
   (vi) *Heracleum napanense* D. Don
(vii) *Heracleum wallichii* DC
(viii) *Nardostachys jatamansi* DC
(ix) *Neopicrorhiza scrophulariiflora* (Pennel) D. Y. Hong
(x) *Panax pseudoginseng* Wall. Var. *angustifolius* (Burkill) Li
(xi) *Panax pseudoginseng* Wall. Var. *bipinnatifidus* (Seemab) Li
(xii) *Panax pseudoginseng* Wall subsp. *himalicus* Hara
(xiii) *Pentapanax fragrans* (D.Don) Ha
(xiv) *Podophyllum sikkimense* Chatterjee and Mukherjee
(xv) *Rheum acuminatum* Hook.f.
(xvi) *Swertia chirayita* (Roxb. Ex. Fleming) Karsten
(xvii) *Taxus baccata* L. subsp. *wallichiana* Zucc.
(xviii) *Tupistra nutans* Wall. ex. Lindl.
(xix) *Zanthoxylum acanthopodium* DC

2. Medicinal plants of sub tropical and sub temperate regions (1200-1850m):

(i) *Acarus calamus* L
(ii) *Begonis palmata* D. Don
(iii) *Begonia picta* Smith
(iv) *Callicarpa vestita* Wall. ex. Clarke
(v) *Clematis buchananiana* DC
(vi) *Cureuma zedoaria* (Berg.) Rosc.
(vii) *Fraxinus floribunda* Wall
(viii) *Girardinia diversifolia* (Link.) Friis
(ix) *Hedychium coronarium* Koen
(x) *Litreses cubeba* (Lour.) Persoon
(xi) *Lycopodium japonicum* Thunb.
(xii) *Phytolacca acinosa* Roxb.
(xiii) *Plumbago zeylanica* L
(xiv) *Rubia manjith* Roxb. Ex Fleming
(xv) *Tertadium fraxinifolium* (Hook) T. G. Hartley
(xvi) Tricosanthes lepiniana (Naudin) Cogniaux
(xvii) Tricosanthes wallichiana (Seringe) Wight
(xviii) Urtica dioica L.

3. Medicinal plants of tropical-sub tropical regions (150-1200 m):

(i) Aloe vera (L) Burm.f.
(ii) Andrographis paniculata (Burm.f.) Wall.ex Ness
(iii) Asparagus racemosus Wild.
(iv) Azadirachta indica A.Jussieu
(v) Cassia fistula L.
(vi) Centella asiatica (L) Urban
(vii) Entada rheedi Sprengel sub sp.sinohimalensis (Grierson and Long) Panigrahi
(viii) Gynocardia odorata R. Brown
(ix) Holarrhena pubescens (Buch-ham.) Wall.ex G. Don
(x) Justicia adhatoda L.
(xi) Oroxyllum indicum (L) Vent.
(xii) Phlogacanthus thyrsiformis (Roxb.ex Hardwick) D.J.Maberley
(xiii) Phyllanthis emblica L.
(xiv) Piper longum L.
(xv) Rauwolfia serpentina Bentham ex Kuíz.
(xvi) Senecio scandens Buch-Ham.ex D. Don
(xvii) Stephania glabra (Roxb.) Miers.
(xviii) Stephania japonica (Thunb.) Miers
(xix) Terminalia bellirica (Gaertner) Roxb.
(xx) Terminalia chebula Retzius.

Cultivation practices

The Darjeeling district has a historical importance of being the only centre in India having the large-scale cultivation of Cinchona since 1865 as a government enterprise. The introduction of more commercial plants such as Ipecac, Digitalis,
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Cultivation practices

The Darjeeling district has a historical importance of being the only central India having the large-scale cultivation of *Cinchona* since 1865 as a governm enterprise. The introduction of more commercial plants such as *Ipecac, Digit*
and others followed afterwards. But, of late, the industry has not been able to compete in the fast developing modern trade nor perform scientifically in the field and laboratory towards producing its finished products. In addition, with its experience of over 150 year of existence the industry has not worked towards conservation and cultivation of endemic wild medicinal elements. In this way, the scope of establishing researches on the feasibility of cultivation of Himalayan herb, and inventing of new drugs was never given a chance to take off.

Besides, there are some institutions such as the Department of Forests, both in Sikkim and Darjeeling, which are practicing cultivation of medicinal plants. Under the sponsorship of the G.B. Pant Institute of Himalayan Environment and Development, the studies on the cultivation and acclimatization of high altitude medicinal herbs was done in Sikkim by the institution itself and the authors (Kalimpong College) in Kalimpong. The results are encouraging, but all such ventures are yet to establish themselves in the commercial level and benefit the cultivators and the people in general.

In this way the activity of cultivation of medicinal plants at the non governmental level is just budding.

Trade and market

There is a growing demand of plant based medicines in the international market. The current level of international trade on medicinal plants is reported to be US$ 800 million. 12% of the world’s requirement worth US$ 100-114 million comes from India and the UK, USA, Germany and Switzerland are the main buyers.

There is no established trade centre dealing with medicinal herbs or products in this part of the nation. However, the regular and increasing wiping out of the mostly high altitude medicinal herbs has been noted in the field survey since the last fifteen years. In almost all major townships and Haats of the hill areas, there are small shops and vendors selling the local herbs (dried) or herbal plants. But such sellers are cautious enough not to treat these herbal items as the mainstay of their business. They are kept as a subsidiary commodity. It should be noted that there is a growing demand for collection of herbs from the wild, but huge quantities cannot be accommodated in the local markets on individual households, unregistered or illegal trade of herbal parts in this region.
The major pharmaceutical industries and other traders have time and again looked for the supply of various medicinal plants in this region and they have not been able to get their quantity of raw materials. This is because this region does not have a single enterprising large scale farmer devoted to this line. Again, the small scale or seasonal cultivators have already had a bad experience with the market system and given up the practice rather than face the loss.

It may be concluded that Darjeeling-Sikkim Himalaya is facing unorganized trade and mismanagement. As far as the cultivation and propagation of high value health care herbs is concerned, there are only a few places in the world comparable to the eastern Himalayas, which are blessed by the habitat and climatic suitability. On the other hand, the rural masses are tired of traditional ever decreasing cultivation and are looking for newer profitable ventures. There is an ample demand in the industries. Yet, the small scale growers are failing to sell their produces and business comes to a grinding halt.

Therefore, the government and the private establishments such as the Department of Forests, Agriculture, Directorate of Cinchona and Other Medicinal Plants, industries, research institutions and the NGOs should come forward with deeper involvement and take part in the sustainable large scale production and proper market management of these valuable medicinal and other Himalayan herbs of economic interest.

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