



Sustainable Use of Medicinal Plant Biodiversity for Poverty Alleviation

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The term “biodiversity” is not that simple as it looks to be. It involves complexity of meanings and levels. Our Earth is home to a rich and diverse array of living organisms, whose genetic diversity and relationship with one another and with their physical environment constitutes biodiversity. Thus, biodiversity is the natural biological capital of the earth, and its conservation and sustainable management presents important opportunities for all the nations especially developing countries like India.

By 1987, there was growing scientific evidence of the erosion of biodiversity on global scale. Since then there has been conventions, conferences, seminars etc. to discuss about the issue. International conventions with specific aspects of biodiversity like Convention on Wetlands of International Importance, especially waterfowl habitat (known as the Ramsar Convention, 1971), the Convention to Regulate International Trade In Endangered Species of Fauna and Flora (Washington, 1973), the Convention of Migratory Species of Wild Animals (Bonn, 1980). Estimates of biodiversity loss involve large degrees of uncertainty and are derived from extrapolations of measured and predicted habitat loss and estimates of species richness in different habitats.

As a very famous tribal song says- “I love forests, they keep me, my animals and my fields healthy”, plants are considered to be an integral and major contributor to biodiversity. Different parts of these medicinal plants continue to be an important source of medicines, as they have been throughout human history (Fig. 1). The Indian subcontinent is endowed with a rich expertise in local health traditions. The traditional medicine in India functions through two

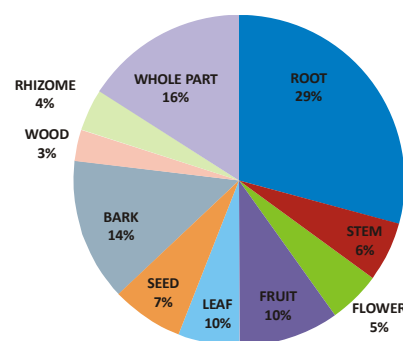


Fig. 1 Percentage of Plant parts utilised for medicinal purpose

social streams. One is the local folk stream, which is prevalent in rural and tribal villages of India. The carriers of these traditions are millions of housewives, thousands of traditional birth attendants, bone setters, practitioners skilled in acupuncture, eye treatment or treatment of snakebites, the traditional village level herbal physicians in tribal areas. A second level of traditional health care system is the academic or classical system. This consists of codified and organized medical wisdom with sophisticated theoretical foundations and philosophical explanations, expressed in thousands of regional manuscripts covering treaties on all branches of medicine and system like Ayurveda, Siddha, Unani, Yoga, Naturopathy and Amchi are expressions of this stream. The herbal history can be traced back to our religious documents like Rigveda where herbal plants have been used to treat man and animals. In today's era, medicinal plants play a significant role in the subsistence economy of the people, especially those living in the rugged and impoverished hills, mountains and rural interiors (Table 1).

Collection, simple processing and trading of medicinal plants for different purposes (Fig. 2) contribute in the economic upliftment of the poor in these regions. A study carried out by CECI-India indicated that from a single district of Pithoragarh in Uttaranchal state of India, more than 1300 tons of medicinal plants are collected and traded annually, most of them illegally. The local people of Great Himalayan National Park of Himachal Pradesh earn around \$ 100 /HH/year and this contributes majority for their livelihood.

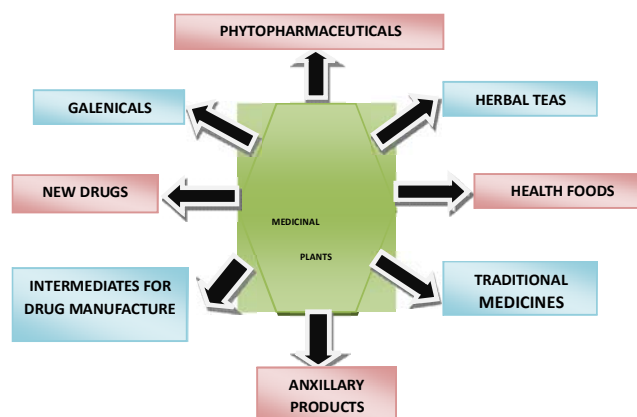


Fig. 2 : Multidimensional use of medicinal plants.

Table 1. Biological activity of some Indian medicinal plants

PLANT NAME	Biological activity
<i>Acacia nilotica</i>	Antimutagenic, antioxidant, antiulcer, analgesic, antiatherosclerotic, antibacterial, antiquorum sensing
<i>Acorus calamus</i>	Cardioprotective, antipyretic
<i>Asparagus racemosus</i>	Diuretic, antiseptic, aphrodisiac, galactagogue, antibacterial, anticancer
<i>Alpinia galangal</i>	Rheumatism, fever, cataract, bronchial, catarrah, aphrodisiac, carminative
<i>Allium sativum</i>	Antibacterial, antioxidant, anticancer, anticarcinogenic, antihepatotoxic, anti-HIV
<i>Aloe vera</i>	Antioxidant, inhibits hepatocarcinogenesis, antipyretic
<i>Albizia lebbeck</i>	Night blindness, diarrhoea, astringent
<i>Ammora rohitika</i>	Antitumour, liver diseases, rheumatism, antioxidant
<i>Azadirachta indica</i>	Astringent, antiperspirant, antiseptic, antioxidant
<i>Boerhavia diffusa</i>	Asthma, jaundice, anaemia
<i>Bixa orellana</i>	Astringent, purgative, antipyretic, jaundice, gonorrhoea
<i>Brassica campestris</i>	Antiasthmatic, antifeedant, antimutagenic, antiseptic, cancer-preventiv, counterirritant, decongestant,
<i>Coriandrum sativum</i>	Antimutagenic, antioxidant, antitumor, antiatherosclerotic, antibacterial, anticancer, antihepatotoxic
<i>Cassia fistula</i>	Antihelmintic, laxative, leprosy, antidiabetic, antipyretic
<i>Casuarina equisetifolia</i>	Ulcers, gonorrhoea, constipation, coughs
<i>Curcuma longa</i>	Antioxidant, antiseptic, antibacterial, anticancer, antihepatotoxic
<i>Cinnamomum tamala</i>	Gonorrhoea, carminative, antirheumatic, antidiarrhoeal, culinary uses
<i>Cinnamomum zeylanicum</i>	Astringent, carminative, culinary uses



PLANT NAME	Biological activity
<i>Embllica officinalis</i>	Antimutagenic, antioxidant, antiviral, immunomodulatory, hepato-protective
<i>Eucalyptus crebra</i>	Anthelmintic, antibacterial, anticancer, anticariogenic, antidiarrheic, antidysenteric, antihepatotoxic, antiHIV, antihypertensive, antilipolytic, antimutagenic
<i>Euphorbia hirta</i>	Bronchial asthma, expectorant, antioxidant
<i>Ficus bengalensis</i>	Astringent, anti-inflammatory, diabetes, leucorrhoea, dysentery
<i>Ficus carica</i>	Anti-tumour, eczema, laxative
<i>Lagerstroemia speciosa</i>	Antidiabetic, antiHIV, anti-inflammatory, antimutagenic, antioxidant, antiplaque, antiseptic
<i>Lawsonia inermis</i>	Leprosy, antidiuretic, anti-inflammatory, antioxidant
<i>Leucaena leucocephala</i>	Anthelmintic, antioxidant, antibacterial
<i>Glycyrhiza glabra</i>	Tonic, cooling, demulcent, antidiuretic, laxative
<i>Myristica fragrans</i>	Antibacterial, anticancer, antifertility, antiaging, antiherpetic, antihistaminic, antiimplantation, antiinflammatory, Antileukemic, antilymphocytic, antimutagenic, antioxidant, culinary
<i>Murraya koenigi</i>	Culinary, antiacne, antiaging, antiasthmatic
<i>Ocimum sanctum</i>	Digestive, bronchitis, gastropathy, anthelmintic
<i>Piper longum</i>	Immunomodulatory, antioxidant
<i>Pluchea lanceolata</i>	Antiartritic, antipyretic, analgesic
<i>Polyalthia longifolia</i>	Anthelmintic, antipyretic, antibacterial, antidiabetic
<i>Trigonella faenumgraecum</i>	Antibacterial, anticancer, antitumour, antihistaminic, antiinflammatory, antimutagenic, antioxidant, culinary
<i>Trigonella corniculata</i>	Antioxidant, anticancer, culinary
<i>Thuja arvensis</i>	Anti-inflammatory, antibacterial, antifungal, antiviral, anticancer
<i>Santalum album</i>	Antioxidant, analgesic, anesthetic, antibacterial, antihemorrhoidal, antiseptic, antisyndromic, antispastic, antiviral, antiwrinkle, cancer-preventive, CNS-depressant
<i>Saraca indica</i>	Astringent, antioxidant, menorrhagia
<i>Terminalia arjuna</i>	Cardiotonic, leucorrhoea, ulcers, liver cirrhosis, hypertension
<i>T. bellerica</i>	Anti-inflammatory, anthelmintic, antipyretic, dropsy, bronchitis
<i>T. chebula</i>	Jaundice, leprosy, cardiac disorders, anti-inflammatory, antiseptic,
<i>Tinospora cardifolia</i>	Immunomodulatory, antipyretic, antioxidant
<i>Trewia nudiflora</i>	Antioxidant, antipyretic, antitumor (lung & breast), antiviral, cancer-preventive, hepato-protective



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)



(k)



(l)

(a) *Euphorbia hirta*; (b) *Eclipta alba* (c) *Andrographis paniculata*; (d) *Aloe vera*; (e) *Bacopa monnieri*; (f) *Withania somnifera*; (g) *Rauvolfia serpentina*; (h) *Acacia nilotica*; (i) *Stevia rebaudiana* (i) *Psoralea corylifolia*, syn. *Cyamopsis psoraloides*; (k) *Terminalia arjuna*; (l) *Asparagus racemosus*



India is one of the 12 mega biodiversity centres having 47,000 plant species out of which 1500 plants are of medicinal value. Around 70% of India's medicinal plants are found in tropical forests spread across the Western and Eastern Ghats, the Vindhyas, Chota Nagpur plateau, Aravallis, the Terai regions in foothills of Himalayas and North East. Less than 30% are found in temperate forests and higher altitudes. The huge diversity has earned India in herbal sector about Rs. 42,000 crores per annum. Majority of people in the developing countries like India use plant based medicines for health care since time immemorial. But, since past few decades resurgence of interest in green products in the industrialized countries has a huge market for plant based products. It is this great surge in use of medicinal plants as source of drugs which has been met by indiscriminate harvesting of the flora. More than 85% of the medicinal plants used by Indian Industry are collected from wild and much of this is illegal. 70% of the collection involves destructive harvesting practices like overexploitation, fragmentation of natural habitats and introduction of exotic species. A recent assessment has brought into notice around 200 Red list medicinal plants (according to IUCN guidelines). Medicinal plants can save lives, livelihoods and cultures until they themselves are saved.

Therefore, in order to maintain a sustainable supply of the raw materials from the forests their overexploitation needs to be stopped and strict laws should be enforced by the Government for the conservation of forests. Conserving forest biodiversity by valuing and harnessing it as medicine is in correlation with poverty reduction and local public health prevention efforts. The conservation program can be strengthened by using the people who have knowledge and also respect for the Mother Nature like the Tribals. The Indian Subcontinent is inhabited by 88.2 million tribal populations belonging to over 577 tribal communities with 277 linguistic groups. With the passage of time they have used a great deal of knowledge on the use of plants and plant products in curing various ailments but all this has been done

without disturbing the delicate balance of the ecosystem. An active participation of the people from diverse group is required for the sustainable use of resources (Fig. 4).

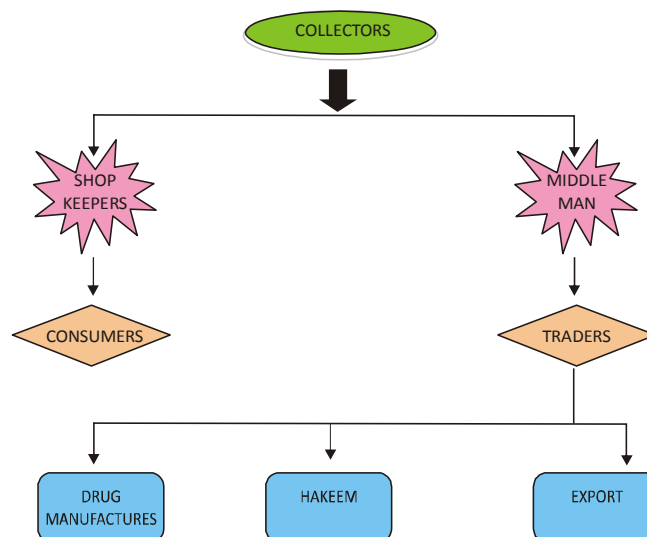


Fig. 4 Chain of people involved in sustainable use of medicinal resources

A step in this field has already been taken by Dr. Palpu Pushpangadan who gave Pushpangadan Model of Benefit Sharing (1995), according to which 50% of the royalty received from drug "Jeevni" made from Arogyapacha is given to the "Kani Tribe" who revealed the medicinal properties of the plant. Also one of the group-Women can be great contributors in the conservation program since generally in tropical regions rich in biodiversity it is these women who manage most of the plant resources that are used by humans. Thus, with the involvement of the collectors, producers and traders including ultimate users, women and ethnic groups; the motive of sustainable use of the resources can be achieved along with the upliftment in the economic status of the concerned people.
