



Plant based raw drugs sold in the markets of the Darjeeling Himalaya, India: A case study

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Abstract

Plant based raw drugs are inexpensive and readily available, which are integral part of the local health care system of Darjeeling Himalaya, India. These drugs are widely used for treating common ailments and injuries without any side effects, and are prevalent in the hill regions of the Darjeeling district. Present study is the outcome of oral interviews of three sellers in Darjeeling town to record the taxonomic identity, parts used, its uses and the mode of administration of these proven ethno-medicinal botanical resource available in the market.

Key words: Raw drugs, Darjeeling hills, ethno-medicine, healthcare system

INTRODUCTION

Plants have been used in the traditional healthcare system from time immemorial. Numerous wild and cultivated plants play a vital role in cultural and traditional healthcare system of local poor inhabitants in the hill regions. Practice of herbal treatment evolved over generations of experience and practice, and the information passed through verbal communications. Herbal medicines are becoming popular worldwide due to its growing recognition of natural products being cheaper and without much side effects (Anonymous 2009).

Out of the 20,000 medicinal plants listed by the WHO globally, India is one of the richest centers of medicinal plant resources and contributes 15 – 20% of the total species (Anonymous 2009; Hamilton & Radford 2007). At present, there is a worldwide movement for assessing the plant resources and researches for new plants which have medicinal and economical value. Researchers are not only focusing on ethnobotanical and ethnomedicinal investigation, but also studying to assess their population in the wild to fulfill the increasing demand of herbal products (Anonymous 2009; Rai 2010).

Darjeeling Himalaya has rich tradition of ethno-medicine because of large number of indigenous ethnic groups. These people have in-depth understanding about plants - for food and medicine because they largely survive on the forest resources for their daily life. Ethnomedicinal practices based on local plant resources like Jari-butti, Amchi, etc. due to inadequate public health centers across the hills are still underuse (Chhetri *et al.* 2005; Ghosh & Tripathi 2019).

The Nepali system of medicine has wider base, however, the traditional system of medicine has no organized set up in India. At present the system survives at the peddler's level with small stalls in the market place with subsistence income. Therefore, there is a need to explore the current ethnomedicinal practices available in the region. The present study aims to document various species of medicinal plant sold in Darjeeling town as raw drugs.

MATERIALS AND METHODS

The study was conducted in Darjeeling town to document the plant based raw drugs. The local sellers were interviewed through structured questionnaire. Information like local name,

uses, mode of administration was gathered directly from the sellers. Photograph of the sample were taken for authentication. Samples were identified in the Department of Botany, St. Joseph's College and with the help of local floras (Cowan & Cowan 1929; Gierson & Long 1984, 1987, 1991, 1999) and other medicinal plant related literatures (Gurung 2002; Das & Mandal 2003). The updated nomenclature and family delimitation was done as per www.plantsoftheworldonline.org and www.theplantlist.org.

RESULT

A total of 36 species of plant based raw drugs belonging to 25 families are sold for treating various ailments. Among these, plants belonging to family Leguminosae with five species was the largest family followed by Combretaceae and Zingiberaceae with three species each, Ranunculaceae, Apocynaceae and Malvaceae with two species each and remaining nineteen families are represented by single species. Botanical names, local names, families, parts used, uses and mode of administration are provided in Table 1.

Table 1. Names of the plant based raw drugs, their taxonomic status, parts used, uses and mode of administration

Scientific name	Local name	Parts used	Uses	Mode of administration
<i>Acacia catechu</i> (L.f.) Willd. [Leguminosae]	<i>Kbayer</i>	Stem/heart wood	Muscular pain and injuries	Cooked with milk
<i>Aconitum heterophyllum</i> Wall. ex Royle [Ranunculaceae]	<i>Kalo bikuma</i>	Rhizome	Used in rheumatism fever and body pain.	Powder soaked in water or boiled
<i>Acorus calamus</i> L. [Acoraceae]	<i>Bojho</i>	Rhizome	Used in fever, sudden muscle pain; also used as an insect repellent	Roots chewed raw
<i>Allium wallichii</i> Kunth [Amaryllidaceae]	<i>Ban Lasun</i>	Bulb	Bulb useful in the treatment of cholera and dysentery; reduce blood cholesterol levels and acts as a tonic	bulb is boiled and then fried in ghee, and consumed
<i>Asparagus racemosus</i> Willd. [Asparagaceae]	<i>Satawari</i>	Tuberous root	Used as diuretic for the treatment of dysentery, diarrhea, blood diseases, liver leprosy, epilepsy, night blindness, rheumatism and gonorrhoea	Boiled with water and consumed
<i>Astilbe rivularis</i> Buch.-Ham. ex D.Don [Saxifragaceae]	<i>Bodo okhati</i>	Rhizome	It is used as a blood purifier; also useful in diarrhea and dysentery	The root can be chewed raw or boil in milk and consume
<i>Clematis buchananiana</i> DC. [Ranunculaceae]	<i>Pinashey lahara</i>	Roots and aerial parts	It is used to cure sinusitis, also an antiviral	Roots roasted and smoke inhaled
<i>Curcuma zedoaria</i> (Christm.) Roscoe [Zingiberaceae]	<i>Kalo Hardi</i>	Rhizome	It is useful in food poisoning	Chewed raw or boiled in water or milk and the liquid is consumed
<i>Dactylorhiza hatagirea</i> (D.Don) Soo [Orchidaceae]	<i>Panch anle</i>	Tuber	It is used for body-ache, cuts and bruises	Dried tuber grind and mixed with milk and taken
<i>Entada gigas</i> (L.) Fawc. & Rendel [Leguminosae]	<i>Pangra</i>	Seed	It causes vomiting, also used as an astringent that contracts body tissues and mums	Seed is grind and consumed

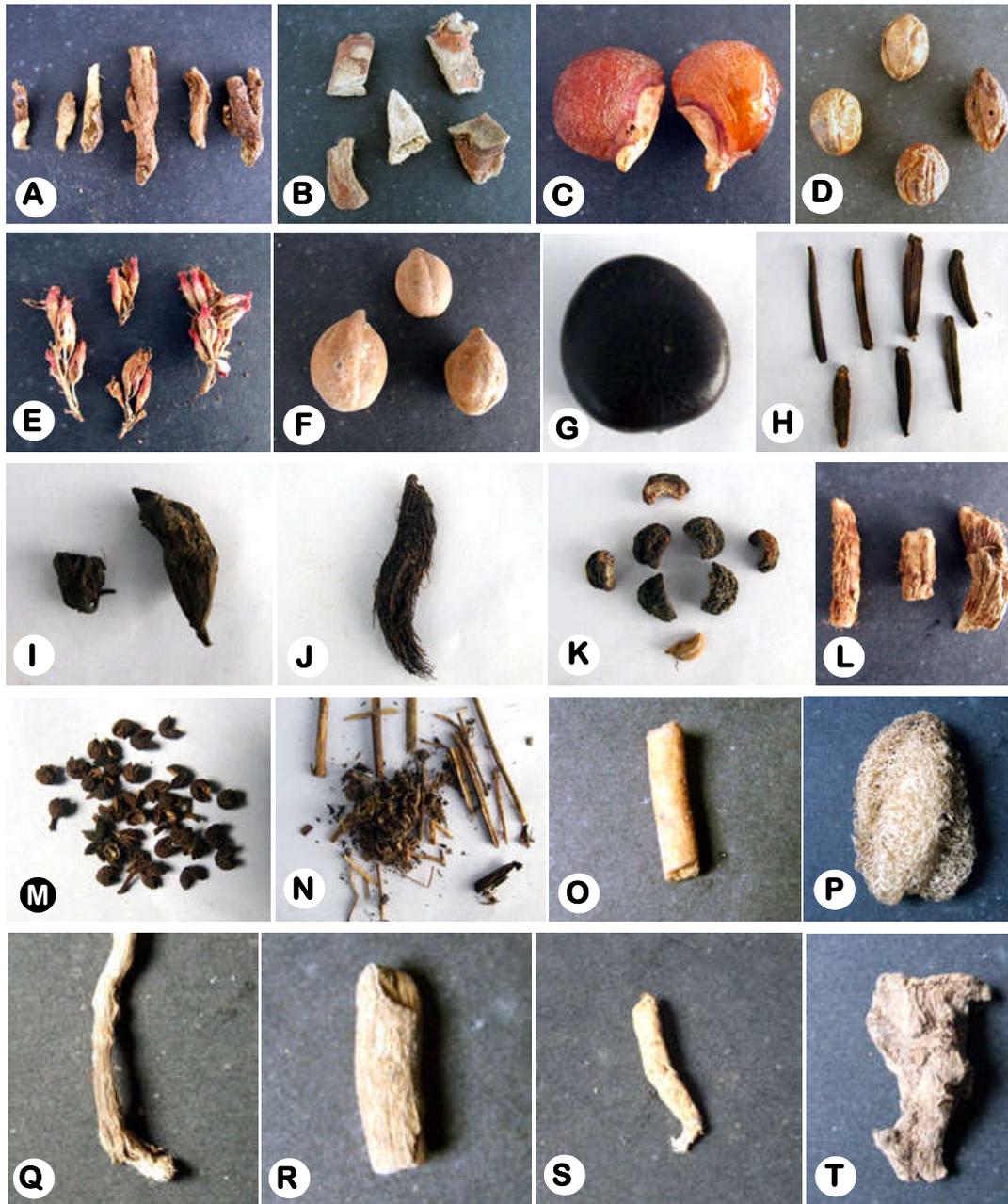


PLATE - I. Marketed raw drugs in Darjeeling: A. Stem of *Glycyrrhiza glabra*; B. Root-stock of *Piper betle*; C. Fruits of *Sapindus mukorossi*; D. Fruits of *Terminalia chebula*; E. Flowers of *Woodfordia fruticosa*; F. Fruits of *Terminalia bellirica*; G. A seed of *Entada gigas*; H. Stem (phyloclad) of *Viscum articulatum*; I. Root of *Aconitum heterophyllum*; J. Root of *Nardostachys jatamansi*; K. Pericarp of *Phyllanthus emblica*; L. Rhizome of *Acorus calamus*; M. Fruits of *Zanthoxylum armatum*; N. Aerial parts of *Swertia chirayita*; O. Tuberous root of *Asparagus racemosus*; P. Fibrous mesocarp of *Luffa operculata*; Q. Root of *Clematis buchananiana*; R. Root of *Rauvolfia serpentina*; S. Root of *Withania somnifera*; T. Rhizome of *Curcuma aromatica*.

Scientific name	Local name	Parts used	Uses	Mode of administration
<i>Fraxinus floribunda</i> Wall. [Oleaceae]	<i>Lakuri</i>	Bark	It is useful in curing rheumatism and gout	Root and barks is chewed raw or boiled in water and consumed
<i>Glycyrrhiza glabra</i> L. [Leguminosae]	<i>Jethi madhu</i>	Roots	Used in cough, fever, urinary tract infection and sub-acute pharyngitis	Roots chewed raw
<i>Helicteres isora</i> L. [Malvaceae]	<i>Mrigasinga</i>	Fruit and Bark	Fried pods used as anti-helminthic. Bark used in diarrhea and dysentery	Fruit pods fried and taken. Decoction of bark is used for the treatment
<i>Hibiscus sabdariffa</i> L. [Malvaceae]	<i>Lal chan</i>	Flower	It is also used in dysentery and diarrhea	Decoction of floral part taken
<i>Kaempferia rotunda</i> L. [Zingiberaceae]	<i>Bhui champa</i>	Bulb	It is useful in setting bone fractures	The paste of the bulb is applied to the affected part
<i>Luffa operculata</i> (L.) Cogn. [Cucurbitaceae]	<i>Ban Toria</i>	Fruit	It is used to cure Jaundice, diabetes	The dried seed is grind and decoction taken twice in the morning and evening before food
<i>Macrotyloma uniflorum</i> (Lam.) Verdc. [Leguminosae]	<i>Gabat</i>	Seeds	It helps in curing measles, chicken pox, tumors and asthma	Boiled in water and cooled water taken
<i>Nardostachys jatamansi</i> (D.Don) DC. [Caprifoliaceae]	<i>Jatamasi</i>	Whole plant	Used as heart tonic, laxative, skin diseases, leprosy, ulcers; helpful in improving urination, menstruation and digestion	Root is eaten raw
<i>Neopicrorhiza scrophulariflora</i> (Pennell) D.Y. Hong [Plantaginaceae]	<i>Kutki</i>	Root	It is used as blood purifier, appetizer, laxative; also used in dropsy, jaundice and bile trouble	Roots are boiled in water or milk and consumed
<i>Phyllanthus emblica</i> L. [Phyllanthaceae]	<i>Amala</i>	Fruit	Used as laxative, liver tonic, in cough, indigestion, constipation, diarrhea and dysentery	Either the fruits are consumed raw or to be boiled with water and consumed
<i>Piper betle</i> L. [Piperaceae]	<i>Pan ko Jara</i>	Root	It is usually used in cough, sore throat	Roots chewed raw
<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurtz [Apocynaceae]	<i>Sarpagandha</i>	Roots	Used in high blood pressure, antidote for snake bite, epilepsy and insomnia	Root boiled in water and consumed. In case of epilepsy it is applied to eye lid
<i>Rhododendron arboreum</i> Sm. [Ericaceae]	<i>Lali guras</i>	Flower	Used in dysentery and diarrhea	Fresh or dried flowers to be consumed raw
<i>Sapindus mukorossi</i> Gaertn. [Sapindaceae]	<i>Ritha</i>	Fruit	Fruit juice is used as hair conditioner and is also used to cure burnt parts of the body	The fruit is rubbed in water to form lather and then used
<i>Saraca indica</i> L. [Leguminosae]	<i>Ashok Chal</i>	Bark of root	Some of the ailments of women (uterine disorder) can be cured from the juice obtained from the bark; pulp of the	The bark is boiled with water and consumed

Scientific name	Local name	Parts used	Uses	Mode of administration
<i>Saraca indica</i> L. [Leguminosae] (contd.)			blossom can also be used as a remedy for dysentery and diabetes and internal piles	
<i>Stephania glabra</i> (Roxb.) Miers [Menispermaceae]	<i>Taubarkey</i>	Root bulb	powder of the root is used to treat diabetes, tuberculosis, asthma and fever	Bulb boiled in water and consumed
<i>Swertia chirayita</i> (Roxb.) Buch.-Ham. ex C.B. Clarke [Gentianaceae]	<i>Chirauto</i>	whole plant	It is used as a tonic in skin diseases, chronic fever and leucoderma, cough, cold, diarrhea, stomach ache	The plant is boiled with water and consumed
<i>Terminalia arjuna</i> (Roxb. ex DC) Wight & Arn. [Combretaceae]	<i>Arjun chal</i>	Bark and fruit	Preparation of bark and fruit used as cardiac tonic, astringent and febrifuge; useful in blood dysentery, blood pressure leucorrhea	Decoction of bark mixed with milk and honey and consumed every morning in an empty stomach
<i>Terminalia bellirica</i> (Gaertn.) Roxb. [Combretaceae]	<i>Barra</i>	Fruit, Bark	Fruits used as to cure piles, diarrhea, cough, sore-throat; bark used for anemia and leucoderma	Fruit grind into powder, boil with water and taken
<i>Terminalia chebula</i> Retz. [Combretaceae]	<i>Harra</i>	Fruit	Used as a cardiac tonic and various ailments like asthma, diarrhea, dysentery blood pressure and piles	Fruit grind into powder, boil with water and consume
<i>Viscum articulatum</i> Burm.f. [Santalaceae]	<i>Harchur</i>	whole plant	Bone fractures, muscular pains and injuries	Powder Mix with milk boil and consume
<i>Withania somnifera</i> (L.) Dunal. [Solanaceae]	<i>Aswagandha</i>	Roots	Used as aphrodisiac, tonic, rheumatism and health tonic	Roots powder mixed with milk, ghee and honey, boil and consume
<i>Woodfordia fruticosa</i> (L.) Kurz [Lythraceae]	<i>Dhuaro Phul</i>	Flower	It is used in dysentery and diarrhea	Dried flower consumed raw or decoction taken
<i>Wrightia tinctoria</i> R.Br. [Apocynaceae]	<i>Indra Jaav</i>	Fruit	It is used to cure diabetes, high blood pressure	Soaked fruit juice taken every morning in empty stomach
<i>Zanthoxylum armatum</i> DC. [Rutaceae]	<i>Jat timbur</i>	Fruit	Useful in gastric problems and other stomach problems	Fruits taken raw
<i>Curcuma aromatica</i> Salisb. [Zingiberaceae]	<i>Phachyeng</i>	Rhizome	It is effective in jaundice, skin diseases, diarrhea and indigestion, parasitic infection, generally healing	Taken raw or boiled in milk and can be consumed as a tonic

Most of the plant materials sold are used in treating common ailments prevalent in the region. Plants are used to cure common diseases related to skin, cold, fever, cough, headache, diarrhoea, uterine problems, toothache, stomach ache, wounds, diabetes, rheumatism, asthma, dysentery, bone fractures, hair loss and poisoning. Most of these plant species were used in treating more than one disease. Most sought after medicinal plant among these are *Viscum articulatum* used in treating fractures, *Aconitum heterophyllum* and *Swertia chirayita* in treating fever, skin disease and cold and cough followed by *Terminalia belirica*, *T. chebula* and *Phyllanthus emblica*

used for multiple purposes. *Woodfordia fruticosa* is quite popular in treating diarrhoea and dysentery which is quite prevalent in the hills.

Different parts of the plants are sold as plant based raw drugs. Among the various plant parts are subterranean parts (roots, bulbs, rhizomes and root tubers), flowers, fruits and seeds, barks and whole plant. In many cases, it was found that different parts of the same species were also used in treating different ailment. The pattern of plant part use is provided in Fig.1. Analysis of parts used indicates highest percentage of the plant raw drugs are sold in the form of dried root/rhizome/bulbs (16 species) constituting 41 % followed by fruits and seeds (11 species) with 28%. Barks (5 species) with 13 %, flowers and whole plant (3 species each) with 8 % each and heartwood (1 species) with 2 % have been found (Figure 1).

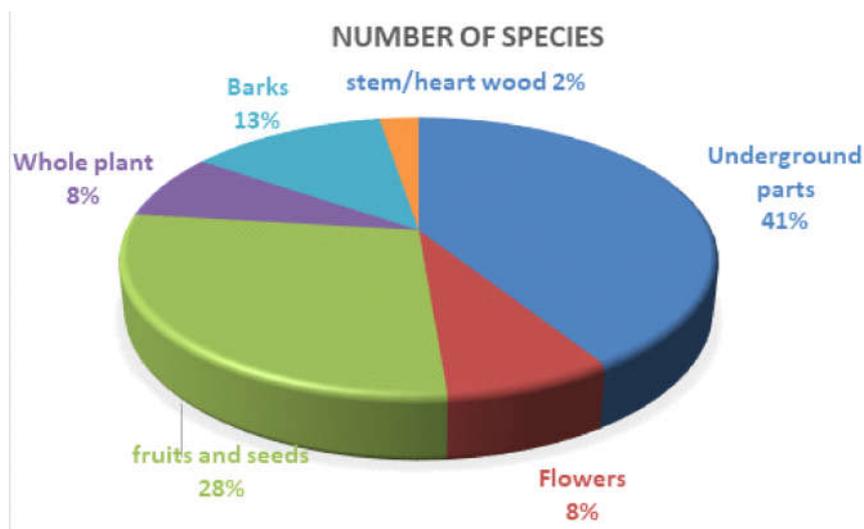


Figure 1. Plant parts of raw drugs sold in the market and their percentage

Many of the plant parts sold in the market fall under IUCN Red list. *Nardostachys jatamansi* is listed as critically endangered and *Aconitum heterophyllum* and *Swertia chirayita* as endangered respectively at global level. Plants like *Rauwolfia serpentina* and *Asparagus racemosus* are assessed as endangered and *Neopicrorhiza scrophulariiflora* as critically endangered in the state of West Bengal using IUCN criteria (Anonymous 2009). *Allium wallichii* is assessed as Endangered in the state of Sikkim (Ved *et al.* 2017). Most of these plants from alpine region are collected from across the Nepal border and sold elsewhere. Similar observation is also made by Olsen & Helles (1997) and Pyakurel *et al.* (2017) in their study.

CONCLUSION

The study has revealed that 36 species of plant based raw drug are being sold in Darjeeling market. The plant materials are collected from the wild either by the seller themselves or are procured from the local people. Many of the plant species sold in the market are listed in the IUCN Red list. The parts used pattern indicates high degree of destructive collection as most of these species constitute the subterranean parts and whole plant parts. This information provides an intervention for their sustainable extraction.

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