

RESEARCH MATERIAL

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Folk Medicinal Plants in the Sikkim Himalayas of India

Abstract

This report deals with 64 species of plants belonging to 42 families and 57 genera. The plants discussed are all used as medicine among ethnic groups in Sikkim. Important ailments purportedly cured by these plants are epilepsy, leprosy, paralysis, asthma, typhoid, diabetes, hemorrhages during childbirth, cholera, as well as others. Some of these plants are also used as food items and play a significant role in the rural economy. A few of these medicinal plants are believed among ethnic people to prolong life and are part of local tradition. Though allopathic medicines are in vogue, herbal medicinal practitioners do a brisk business. The herbals in the region are in danger of economic exploitation by the rural folk as well as commercial collectors. In order to conserve these important resources, management options, including the cultivating of medicinal plants, should be explored.

Keywords: Folk medicine—Sikkim—over exploitation

THE HIMALAYAN REGION is rich in biodiversity due to its varied geographical, physiological, topographical, climatic, and ecological zones (KHOSHOO 1991). The northeastern region of the Himalayas is more luxurious in vegetation and thus is sometimes referred to as the “Cradle of Flowering Plants” (TAKHTAJAN 1969). The region exhibits more diversity in its types of plants than perhaps any other region in the Indian subcontinent, and it is considered as the origin of a large number of plants (VAVILOV 1950).

Sikkim ($27^{\circ} 4' 46''$ to $28^{\circ} 7' 48''$ N, and $88^{\circ} 58'$ to $88^{\circ} 5' 25''$) in northeastern India has an area of 7096 sq. km and its altitude ranges from 100 meters above sea level (the foothills) up to 8598 meters (Mt. Khangchendzonga—the third highest mountain peak in the world), with the timberline, at about 4000 meters, in between. The area thus covers varied ecological zones, viz., subtropical, temperate, sub-alpine and alpine. In such a small area sharp climatic variation in different ecological zones have promoted a rich flora. Sikkim is also a cornucopia of ethnicity. Over twenty ethnic tribes reside there, the major ones being the Bhutias, Lepchas, Limboos, Nepalese, and Tibetans.

HOOKE (1871–97) made the first floristic study of Sikkim, which was followed by a comprehensive work on medicinal plants of Darjeeling and Sikkim by BISWAS (1956). Over 400 plants possessing therapeutic properties have been recorded from the region (SRIVASTAVA and KAPAKI 1990), many of which are used in the traditional medicine of ethnic groups in the region. The rural folk, who mostly live in poverty, collect and sell the medicinal plants in the local market or they work for licensed collectors to supply these plants to a bigger market. The incessant collection over the past many years has made some of these plants scarce in number and some species are on the verge of extinction. The threat of extinction of some important species in the wild has been noted earlier (RAI et al. 2000). The present paper aims to sum up the information on the traditional knowledge of plants, which are used for different diseases and ailments, and which play a vital role in health care

among the ethnic community of Sikkim.

MATERIALS AND METHODS

The methods employed in this study were designed with the purpose of providing baseline information on the medicinal and domestic uses of plant species in local systems and among ethnic communities of Sikkim, through a survey, field visits, and personal observations about the uses of these plants. Extensive formal and informal interviews were conducted with local users and herbal medicinal practitioners. Some local weekly markets—namely Gangtok, Jorethang, Yuksam, Singtam, and Geyzing—were also surveyed between 1997 and 1999 regarding the uses and availability of medicinal plants.

Samples of most of the species were brought to the laboratory and identified on the basis of available scientific studies (HOOKER 1871–97; COWAN and COWAN 1929; BISWAS 1956; POLUNIN and STANTON 1984). The plant samples are preserved as herbarium specimens at the G. B. Pant Institute of Himalayan Environment and Development (Sikkim Unit) with accession number (Gbp-Sk), which stands for the name of the G. B. Pant Institute. The local name for plant species presented is Nepalese because more than 80% of the people speak this language. Seed samples of some species were also collected so that they could be cultivated in the above-mentioned Institute's experimental garden.

FOLK MEDICINAL PLANTS AND THEIR USES

ACONITUM FEROX Wall. (Gbp-Sk-44)

Family: *Ranunculaceae*

Local name: Bikhma

Root is used as an antidote for lethal poisons of local origin. The root is also powdered and consumed to relieve severe body pain, diabetes, debility, asthma, ear and nose discharge, leprosy, paralysis, rheumatism, spermatorrhoea, and typhoid. It is also considered to be an alliterative, diaphoretic, diuretic, expectorant, febrifuge, and dyspeptic.

ACORUS CALAMUS Linn. (Gbp-Sk-16)

Family: *Araceae*

Local name: Bojho

A paste prepared from dry and fresh rhizomes is applied externally on skin diseases and on the forehead during fever.

AESCULUS INDICA (Colber. ex Cambess) Hk. (Gbp-Sk-32)

Family: *Hippocastanaceae*

Local name: Pangra

Seed powder is used in the treatment of mumps. It is considered to be an astringent anti-inflammatory that helps to tone the vein walls.

ALLIUM WALLICHII Kunth. (Gbp-Sk-63)

Family: *Liliaceae*

Local name: Dungdunge

An extract from young leaves is applied to bacterial and microbial infections or is ingested at times of abdominal pain. The plant is eaten cooked for gastritis, and is believed to aid in indigestion, diarrhea, colic, loss of appetite, and in cleaning the digestive tract.

AMARANTHUS SP (Gbp-Sk-17)

Family: *Amaranthaceae*

Local name: Lali sag

Leaf and shoot are eaten cooked to ameliorate the symptoms of diarrhea and dysentery. Seed oil is used as a massage oil to relieve body aches.

ARTEMISIA VULGARIS Linn. (Gbp-Sk-1)

Family: *Asteraceae*

Local name: Titaypati

Fresh leaf extract is mixed in low concentration with water to make a juice appetizer. The leaves are crushed and inserted in nostrils as a plug to stop bleeding. Leaf juice is applied to the head during convulsions and also for earache. The smoke emitted by burning the semi-dried leaves is wafted on burns to expedite the healing process.

ARUNDINARIA MALING Gamble. (Gbp-Sk-19)

Family: *Poaceae*

Local name: Malingo

Tender shoots are eaten cooked for stomach problems, especially stomach ulcers.

ASTILBE RIVULARIS Ham. (Gbp-Sk-18)

Family: *Saxifragaceae*

Local name: Buriokhati

Dried or fresh roots are chewed and consumed to prevent diarrhea and

dysentery. A paste made with the roots, water, and roots of *Bergenia ciliata* is administered externally on the abdomen of women after childbirth to ease body pain and swellings.

BERGENIA CILIATA (Haw.) Stenb. (Gbp-Sk-20)

Family: *Saxifragaceae*

Local name: Pakhanbed

Dried rhizome powder is taken orally or is simply chewed, if fresh, to cure diarrhea, vomiting, fever, cough, pulmonary affections, and boils.

CINNAMOMUM TAMALA Nees & Eberm. (Gbp-Sk-2)

Family: *Lauraceae*

Local name: Tejpata

Leaves are used in the treatment of colic, rheumatism, diarrhea, and scorpion bites.

CLEMATIS BUCHANANIANA DC. (Gbp-Sk-33)

Family: *Ranunculaceae*

Local Name: Pinsasy lahara

Fresh roots are mashed while wrapped in cloth to produce a fluid, the efflu-
vium of which is inhaled through the nose to cure sinusitis and nasal block-
age. The juice is reputed to relieve headaches also.

COSTUS SPECIOSUS (Koenig) Smith. (Gbp-Sk-35)

Family: *Zingiberaceae*

Local Name: Betlauree

Extract from the tubers and stem is given orally (usually before breakfast) to cure urinary tract infections.

CURCUMA ZEDOARIA Roxb. (Gbp-Sk-45)

Family: *Zingiberaceae*

Local Name: Phachyeng

Fresh rhizomes are consumed raw to cure jaundice. The decoction made with local wine is considered most effective. It is also used for nausea, indigestion, flatulence and bloating, and, generally, to improve digestion.

DICHROA FEBRIFUGA Lour. (Gbp-Sk-21)

Family: *Hydrangeaceae*

Local Name: Basak

The dried leaves are ground into powder and administered orally during times of fever.

DIPLAZIUM POLYPODIOIDES Bl. (Gbp-Sk-22)

Family: *Filices*

Local Name: Kaliningro

Fresh or dry roots are eaten to cure dysentery.

DRYMARIA CORDATA Willd. (Gbp-Sk-15)

Family: *Caryophyllaceae*

Local Name: Abijalo

The leaves and stems are rolled in a banana leaf and heated on cinders. The content, while hot, is then transferred to a thin cotton cloth and the emanating vapor is immediately inhaled through the sinuses to cure sinusitis and nasal blockade. The plant extract is also reported to be an antifebrile and laxative.

ERYNGIUM FOETIDUM Linn. (Gbp-Sk-46)

Family: *Apiaceae*

Local Name: Lepcha dhania

Juice extracted from whole plant is applied to remove body parasites and infection and to relieve itching.

EUPATORIUM CANNABINUM Linn. (Gbp-Sk-3)

Family: *Asteraceae*

Local Name: Banmara

Leaves and tender stems are crushed fresh and the juice is applied to cuts and bruises. Sometimes when the wound is severe, the squeezed remains of the plant are placed over the wounds and a poultice is applied, which stops the bleeding immediately while the wound is protected from infection. It is also used as a detoxifying herb for fever, colds, flu, and other viral infections.

EVODIA FRAXINIFOLIA Hk. f. (Gbp-Sk-13)

Family: *Rutaceae*

Local Name: Khanakpa

Decoction paste is produced from ripe fruit and is applied on forehead during vertigo.

FICUS CUNIA Ham. (Gbp-Sk-4)

Family: *Moraceae*

Local Name: Khasarey Khanium

Shoot latex is applied over boils as a paste leaving the tip of the boil uncovered. The water extract of the bark is used in bath to fight leprosy and the juice obtained from its roots is administered for liver problems.

HERACLEUM WALLICHII DC. (Gbp-Sk-23)

Family: *Apiaceae*

Local Name: Chimphing

The dried fruits are chewed to treat influenza and sinusitis.

HOLARRHENA ANTIDYSENTERICA Wall. (Gbp-Sk-62)

Family: *Apocynaceae*

Local Name: Aulay khirra

The bark is used as a tonic, expectorant, astringent, anthelmintic, and febrifuge. It is used to fight against hemorrhoids, leprosy and troubles with bile production. The seeds are used against dysentery as well as to relieve pain and swelling caused by snakebites. The root is used to relieve chronic dysentery, and to stop hemorrhaging during childbirth and nosebleeds. Bark powder is ingested orally with water during amoebic dysentery.

HOUTTUYNIA CORDATA Thunb. (Gbp-Sk-5)

Family: *Saururaceae*

Local Name: Hiley jhar

Soup made from boiling the plant in water is consumed to treat urinary troubles.

HYDROCOTYLE ASIATICA Linn. (Gbp-Sk-6)

Family: *Apiaceae*

Local Name: Golpatta

Fresh plant parts are crushed and ingested orally in the morning to reduce high blood pressure. Paste mixed with tender shoots of *Adhatoda vasica* Nees. is consumed to prevent periodic and severe dysentery.

HYMENODICTYON EXCELSUM Wall. (Gbp-Sk-34)

Family: *Rubiaceae*

Local Name: Latikaram

The bark is crushed fresh or dried, and the resulting powder is then taken

orally to treat hemorrhoids.

KAEMPFERIA ROTUNDA Linn. (Gbp-Sk-55)

Family: *Zingiberaceae*

Local Name: Bhui champa

Bulbs are used to make a poultice that is applied to bone fractures and in order to reduce swelling.

LITSEA CITRATA Bl. (Gbp-Sk-24)

Family: *Lauraceae*

Local Name: Sil timur

The fruit is used as a carminative. It is also used to cure headaches, dizziness, hysteria, paralysis, loss of memory, and stomach disorders.

MAHONIA SIKKIMENSIS Takeda (Gbp-Sk-43)

Family: *Berberidaceae*

Local Name: Chutro

Bark is placed in distilled or boiled water to make eyedrops that fight eye diseases.

MENTHA SYLVESTRIS Linn. (Gbp-Sk-7)

Family: *Lamiaceae*

Local Name: Pudina

Green leaves and shoots are used for treatment of gastritis, acidity, and indigestion.

MESUA FERREA Linn. (Gbp-Sk-61)

Family: *Clusiaceae*

Local Name: Nagesuri

Dried bark is used to cure skin diseases and menstrual disorders. Flower is considered to be an astringent, stomachic that is administered as a stimulant and to properly position an unborn child in mother's womb.

MUSA BALBISIANA Colla. (Gbp-Sk-7)

Family: *Musaceae*

Local Name: Ban kera

Juice of pseudo-stem is used against dysentery, oral infection, and to stop a wound from bleeding. Syrup made from the leaf is used for coughs and chest congestion, such as bronchitis.

NARDOSTACHYS JATAMANSI DC. (Gbp-Sk-47)

Family: *Valerianaceae*

Local Name: Jatamashi

Dried roots are used to stop epileptic fits, cholera, and palpitation. They are also used as a health tonic, stimulant, antispasmodic, diuretic, deobstruent, stomachic, and laxative. Liquid extracted from roots is consumed to cure epilepsy, hysteria, heart palpitation, and cholera. Oil extract from roots promotes hair growth.

NASTURTIUM OFFICINALE Br. (Gbp-Sk-8)

Family: *Brassicaceae*

Local Name: Simrayo

Entire plant is boiled in water, from which the soup is made to treat tuberculosis.

ORCHIS CHUSUA D. Don. (Gbp-Sk-56)

Family: *Orchidaceae*

Local Name: Sayno panchaunlay

Fresh root paste is applied on cuts, wounds, and minor bone fractures.

ORCHIS LATIFOLIA Linn. (Gbp-Sk-60)

Family: *Orchidaceae*

Local Name: Salampanja or Panchaunlay

Fresh roots are eaten to treat nervous disorders and as aphrodisiacs. Mucilage and jelly from roots are used to treat diarrhea, dysentery, chronic fever, and body aches. The syrup made out of the root, sugar, and spice (seed powder of *Piper longum*) is drunk to treat general debility, and liquid extract is drunk to relieve hoarseness. A paste made out of both fresh and dry root is applied over cuts and bruises to expedite healing process.

OROXYLUM INDICUM Vent. (Gbp-Sk-37)

Family: *Bignoniaceae*

Local Name: Totala

Leaves are used externally to treat an enlarged spleen, and also to alleviate headaches and ulcers. Root bark is used as a tonic and astringent. It is used to treat diarrhea, dysentery, diaphoretic, and rheumatism. Paste prepared from sesame oil (*Sesamum indicum*) and the powdered bark of the root is given as digestive tonic. The seeds are purgative and taken orally to treat throat complications and hypertension.

OXALIS CORNICULATA Linn. (Gbp-Sk-13)Family: *Oxalidaceae*

Local Name: Chari amilo

Fresh plant decoction diluted in water is taken to treat dysentery.

PAEDERIA FOETIDA Linn. (Gbp-Sk-59)Family: *Rubiaceae*

Local Name: Biri

Entire plant is used to cure several problems: asthma, bowel complaints, colic, diarrhea, diabetes, internal hemorrhages, peritonitis, rheumatism, gout, seminal weakness, and spasms. The dried fruit powder is applied over teeth to alleviate toothache and to prevent tooth decay.

PHYSALIS MINIMA Linn. (Gbp-Sk-26)Family: *Solanaceae*

Local Name: Jangali phakphakay

The fruit powder is rolled into a cigar-like structure and smoked to treat toothaches and fevers.

PHYTOLACCA ACINOSA Roxb. (Gbp-Sk-38)Family: *Phytolaccaceae*

Local Name: Jaringo

Fresh leaves are boiled and consumed to treat body aches. Roots are used to treat sore throats, tonsillitis, swollen glands, and chronic infections.

PICRORHIZA KURROOA Benth. (Gbp-Sk-26)Family: *Scrophulariaceae*

Local Name: Kutki

The bitter roots are employed as a cathartic and digestive tonic, and are eaten at times of fevers and dyspepsia as strong laxative. The roots are also used to treat scorpion bites. The powder of dried roots is taken orally to treat malarial fever, asthma, and chronic fever. It is also used as purgative and dyspeptic.

PIPER BOEHMERIAEFOLIUM Wall. (Gbp-Sk-54)Family: *Piperaceae*

Local Name: Jangli pipla

Fruits are eaten to treat a cold and/or cough.

PIPER LONGUM Linn. (Gbp-Sk-26)

Family: *Piperaceae*

Local Name: Pipla

Unripe fruits are used as alterative and tonic. Mature and dried fruits are taken orally to treat respiratory problems (namely, bronchitis, asthma and cough) or bile and gall bladder obstruction. Mature fruit is taken as carminative, sedative, anthelmintic, and as an abortifacient. Dried seed powder paste is applied on muscular sprains. Oil extracted from the ripe fruit is used to treat leprosy. The roots are considered to be antidotes to snake-bites and effective for cough.

PLANTAGO EROSA Linn. (Gbp-Sk-14)

Family: *Plantaginaceae*

Local Name: Nasey jhar

Root powder is astringent and seed powder taken to treat dysentery and diarrhea.

PODOPHYLLUM SIKKIMENSIS Chatt & Mukh. (Gbp-Sk-58)

Family: *Berberidaceae*

Local Name: Homochari

Brown latex obtained from the unripe fruits is applied to tumors. Roots are used as a blood purifier, vermifuge, purgative, and alterative and considered as a cardiac tonic in small doses. It is also used to treat peristalsis, allergy, and skin inflammations, and as a hepatic stimulant.

PODOPHYLLUM HEXANDRUM Royle. (Gbp-Sk-64)

Family: *Berberidaceae*

Local Name: Papari

Root powder is used as emetic, vermifuge, alterative, and as a blood purifier.

PTERIS BIAURITA Linn (Gbp-Sk-64)

Family: *Pteridaceae*

Local Name: Thaday uniu

Petiole is mashed and the extract is applied on cuts and wounds to stop bleeding and infections.

RHEUM EMODI Wall. ex Meissner. (Gbp-Sk-39)

Family: *Polygonaceae*

Local Name: Khokim

Soup made out of the root after boiling in water is taken to treat fever, body ache, and muscular pain. The roots, both fresh and dry, are used as a tea substitute.

RHEUM NOBILE Hk. f. & Thoms. (Gbp-Sk-30)

Family: *Polygonaceae*

Local Name: Padamchal

Soup made out of the roots after boiling in water is taken to alleviate body swelling due to water accumulation.

RHUS SEMI-ALATA Murr. (Gbp-Sk-40)

Family: *Anacardiaceae*

Local Name: Bakhimlo

Ripe and dry fruit extract is mixed in water and drunk to treat diarrhea and dysentery.

RUMEX NEPALENSIS Spreng. (Gbp-Sk-9)

Family: *Polygonaceae*

Local Name: Halhalay

Root extract in water is consumed to treat hepatitis. It is also applied on scalp to prevent hair loss.

RUBIA CORDIFOLIA Linn. (Gbp-Sk-25)

Family: *Rubiaceae*

Local Name: Majheto

Ripe fruit extract in water is drunk to treat spleen disorders, while liquid extracted from root is taken for urinary complications.

SECHIUM EDULE Sw. (Gbp-Sk-10)

Family: *Cucurbitaceae*

Local Name: Iskus

Green leaves are eaten cooked to cure anemia.

SWERTIA CHIRATA Ham. (Gbp-Sk-31)

Family: *Gentianaceae*

Local Name: Chirowto

Water extracted of the whole plant is consumed to treat liver disorders, chronic fever, bronchial asthma, dyspepsia, and debility. It is also used as febrifuge, laxative, stomachic, anthelmintic, tonic and to treat diarrhea. A

fresh-shoot decoction paste is taken to treat fever. A dried-shoot powder dissolved in boiled milk is taken as a general health tonic.

SWERTIA MULTICAULIS D. Don. (Gbp-Sk-54)

Family: *Gentianaceae*

Local Name: Sarma guru

Root paste is applied externally as plaster for bone fractures.

TAXUS BACCATA Linn. (Gbp-Sk-51)

Family: *Taxaceae*

Local Name: Chharrey salla

Tincture prepared from leaves is consumed in native medicine against epilepsy and indigestion and also used to treat rheumatic and urinary problems.

TERMINALIA BELERICA Roxb. (Gbp-Sk-57)

Family: *Combretaceae*

Local Name: Barra

The powder of dried fruits is taken for indigestion, diarrhea, leprosy, edema, and fever. Seed powder is soaked overnight in water and filtered. The filtrate is used as an eye lotion, dyspepsiac, brain tonic, and to treat hemorrhoids, throat infection, hoarseness, and coughs.

TERMINALIA CHEBULA Retz. (Gbp-Sk-41)

Family: *Combretaceae*

Local Name: Harra

Fruit extract is applied to watering eyes, or is consumed to treat asthma, tonsillitis, and pharyngitis. Bark powder is gargled in water as an astringent, alliterative, and to treat stomatitis. Bark powder is also gargled in water as a dentifrice to treat toothache and bleeding gums, as well as chronic ulcers.

THYSANOLAENA MAXIMA (Roxb.) Kuntz. (Gbp-Sk-11)

Family: *Poaceae*

Local Name: Amliso

Fresh roots decoction paste is used to treat boils and as a mouthwash to prevent halitosis.

TUPISTRA NUTANS Wall. (Gbp-Sk-42)

Family: *Liliaceae*

Local Name: Nakima

Dry powder of inflorescence is eaten to treat diabetes, and as a tonic to relieve body pains.

URTICA DIOICA Linn. (Gbp-Sk-12)

Family: *Urticaceae*

Local Name: Sisnu

Roots and seeds are used to treat diarrhea. Shoot infusion is used as an expectorant and blood purifier. The root extract is gargled in water to alleviate severe coughs and is also applied on scalp to prevent dandruff. Paste is created from the grated rootstock and is applied to minor bone fractures.

VISCUM ARTICULATUM Burm. f. (Gbp-Sk-52)

Family: *Loranthaceae*

Local Name: Harchur

The whole plant is soaked in hot water, strained and ground with the kernel of walnut or castor oil, and is then consumed in order to improve bile and phlegm production. A paste prepared from dry plant powder is applied externally on minor fractures as a plaster.

ZANTHOXYLUM ACANTHOPODIUM DC. (Gbp-Sk-53)

Family: *Rutaceae*

Local Name: Sil timbur

Fruit powder paste is applied on gums to treat dental disorders. The tender branches are used as toothbrushes. Bark and seeds are used as tonics to treat fever and bowel problems.

ZANTHOXYLUM ALATUM Roxb. (Gbp-Sk-28)

Family: *Rutaceae*

Local Name: Bokay timbur

Bark and seed powders are used to treat fever and bowel problems. Paste prepared from fruit powder is used to treat gum and dental disorders. This paste is also used as dyspepsiac and lotion for scabies. Thorn powder is applied on jaws to alleviate toothache.

OBSERVATION

The collection of medicinal plants from the wild is a common and traditional practice among herbal medicinal practitioners and local people in Sikkim. The majority of plants is collected in their entirety, including the

roots, rhizomes, tubers, and bulbs. The taking of plants before they can reproduce seeds is particularly a problem because it reduces the regeneration of these species in their natural habitat. These medicinal plants are not cultivated in private fields in Sikkim and only exist in the wild. The accelerated growth of the human population, recent environmental and cultural changes, and the economic development in the area all pose a threat to the natural resources in Sikkim.

In recent times, the collection of medicinal plants has not only been for personal use but also to sell to local markets or to suppliers who in turn sell them in bigger markets. RAI, PRASAD, and SHARMA (2000) report the following, which shows the extent of the collection of four different plants:

Aconitum heterophyllum — 1.51 kg per square kilometer,

Nardostachys jatamansi — 4.37 kg per square kilometer

Picrorhiza kurrooa — 0.87 kg per square kilometer

Swertia chirata — 0.48 kg per square kilometer

Overexploitation of these species due to their various uses, as well as the trampling of plants at particular places during collection, has changed the habitat conditions and has resulted in a gradual loss of other associated species. The users of these herb plants, moreover, are not taking any direct action to regenerate them. If they locate these herbs, they harvest them but never replant them for the future. We are therefore gradually losing these precious and valuable herbs. Considering the seriousness of the situation, the Department of Forest of the Government of Sikkim has restricted the collection of *Heracleum wallichii*, *Swertia chirata*, *Picrorhiza kurrooa*, *Nardostachys jatamansi*, *Orchis latifolia*, as well as others. The Forest Department has also been planting some of the medicinal plant species back in their natural habitat in certain localities. But the efforts being made to replenish the supply of plants has not been successful due to lack of proper protection from livestock grazing and local collectors. In an attempt to reverse the trend toward extinction, the G. B. Pant Institute of Himalayan Environment and Development, Sikkim Unit, is carrying out research on how to conserve and development these endangered species. Propagation techniques for various species have been developed using seeds or cuttings of stems, stolons, tubers, and rhizomes. A detailed study showing the extent to which these medicinal plants are being removed, as well as their regeneration status and potential growth in their natural habitat, can provide options for managing their growth. One important option would be to encourage users and collectors to cultivate these important species on a large scale in private fields.

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