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ETHNOBOTANICAL SIGNIFICANCE OF THE FLORA OF NEORA VALLEY NATIONAL PARK IN THE DISTRICT OF DARJEELING, WEST BENGAL (INDIA)

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ABSTRACT

Recent floristic survey of Neora Valley National Park in Kalimpong sub-division of Darjeeling district of West Bengal revealed that the park is a rich repository of the ethnobotanically important plant resources that includes species of food, medicine, ornamental, poisonous and other assorted ethnic values. Based on available literature and direct interaction with forest dwellers living in the periphery of the park, altogether 83 medicinal, 59 edible, 18 ornamental, 21 poisonous (irritants and lethal) and 11 plants having fascinating assorted ethnic uses have been recognized. The forest dwellers have their own dictionary of local names for the identification of these valuable plant resources by which they are maintaining their own ancient ethnoscience. Many of these medicinal plant species were assessed to be the valuable resources for the treatment of a range of human ailments for which there are no complete answers in the modern medical science (?).

INTRODUCTION

The district of Darjeeling shares its geographical boundaries with the Kingdoms of Nepal and Bhutan, and the Indian States of Sikkim and Bihar. It also shares the cultural and socio-anthropological relationships with these places. The life of the people of an area are directly linked with the diversity of local floristic resources, providing great scope of ethnobotanical studies. The widely diverse methods of traditional usage of local floristic components for food, fodder, medicine, day-to-day domestic activities, religious-rituals and ceremonies, ethnic cultures and art, etc. form the basis of ethnobotany. Thus, by way of this study, the direct and indirect linkages or relationships between these plant elements and the socio-culture of the native people can be interpreted. This will also help to understand the life-style, economy and the vast traditional knowledge-store of the native people. The botanical wealth of Darjeeling is well known along with its economically potential, exotic and endemic elements (Chatterjee 1940; Biswas 1966; Biswas & Chopra 1956; Das 1986, 1995, 2002; Das & Chanda 1990; Das *et al* 2002; Bhujel 1996; Bhujel & Das 2002; Bhujel *et al* 2002).

The Neora Valley National Park (NVNP), in the Kalimpong subdivision of the district of Darjeeling (West Bengal) is situated between 26°52'3" 27°7'3" North latitude and between 88°45' 88°50' East longitude, with the surface area of *ca* 8800 ha & covering an altitudinal range of 300 m to 3100 m with the undulating ridges and peaks on both sides of Neora Khola (Khola = River). Recent surveys of the bioresources of the park revealed the existence of a very rich flora (Guha 1983; Majumdar *et al.*, 1984; Rai 2001) the importance of which was analyzed by Rai & Das (2002).

Ethnobotanically Darjeeling is an under-explored area except some small and assorted publications like Bhujel (1984 a, b, c), Lama (1989), Yonzone & Mondal (1982), Yonzone *et al* (1981, 1984, 1985), Rai *et al.* (1998) and Rai & Bhujel (1999, 2002). Sikkim is also equally rich in this respect (Bennet, 1985; Sundrial & Rai 1996; Rai & Sharma 1994; Krishna & Singh 1987) and the knowledge collected from either side of the state boarder in this part of the country are supposed to be overlapping and complementary. Darjeeling a highly forested area with so many inhabiting ethnic communities, *viz,* Lepcha, Bhutia, Sherpa, Rai, Limboo, Manger, Gurung, etc. living in far-flung and fringe areas of the district. The ethnobotanical wealth of the district is supposed to be equally rich. Quite a few human settlements are also present on the periphery of Neora Valley National Park (Table 1), where people are still leading a much primitive form of tribal life. Fighting

Table 1: Names and locations of villages situated in the vicinity of the Neora Valley National Park

Sl. No.	Names of Villages	Location of Villages
1.	Phari Busty	Above Samsing in the foothills of the valley.
2.	Suntalay Busty	Bordering Samsing Tea Estate, Phari Busty and the Neora Forest at the terminal end of the NVNP in the terai region.
3.	Kolbong Busty	A distant village hamlet in between Lava and Chouda Feri.
4.	Todey-Tangta Villages	In the lower hill sides and bordering Kingdom of Bhutan.
5.	Mulkharka Busty	In Sikkim bordering NVNP.
6.	Sakam Busty	A few households recently settled in the Prak border towards Gorubathan.
7.	Banra Bhutan village	Villages in the immediate border areas of the Kingdom of Bhutan.
8.	Kuwa Paani	Small hamlet above Phapar Kheti and below Tiffin Danra.
9.	Sherpa Taar	Very near but little below Tiffin Danra.
10.	Tiffin Danra	Situated in between Lava and Kwapani.
11.	Phapar Kheti	Above Chelkhola and below Kwapani.

with the vagaries of nature, they have generated huge knowledge for their sustenance. They have learnt to use the vast plant wealth of the area for their own benefit. The present tribal population of the area has inherited that vast knowledge-store which is today confined mainly with the older generations of these communities, and is gradually diminishing due to the inflow of the items of the modern civilization. Whatever ethnobotanical knowledge we witness today is almost based on folklore and cultural heritage in coded form or myths. Therefore, what is most important today is to record this vast knowledge-store in scientific temperament, which may, in due course, serve to meet the complex and increasing needs of human being.

Realizing the essence and gravity of this, the present study deals with the ethnobotanical aspects of plant resources of Neora Valley National Park.

MATERIALS AND METHODS

The Park management authorities and the local people living around the Park were involved in the study. Available ethnomedicinal literature covering Darjeeling and Sikkim and on the same tribal groups were consulted and prepared the inventory of their useful plants. In addition, local people, folk-medicine practitioners including herbal bone-setters were approached and interacted, brought to confidence and collected data were recorded carefully. Based on collected information, including local names, plants were collected from the park area and again cross-checked with resource persons to verify that the collected plant is actually the referred one or not. For edible and fodder plants, collectors, mainly the ladies were consulted. Their collected fodders were analyzed and then looked for their presence inside the park.

OBSERVATIONS AND DISCUSSIONS

The present survey recorded the presence of a very good number of plants of ethnic importance in the flora of Neora Valley National Park. Just a simple classification into different useful groups is not enough to understand the actual uses of these plants. So, all the recorded plants are discussed here in tabular form.

1. Ethnomedicinal Plants: The ailments treated by the plant species not only include the common ones like cough and cold or fever or wounds but also some of the serious diseases. However, a few usage of some of these species appeared to be examples of *doctrine of signature*, eg., the consumption of corolla of *Rhododendron arboreum* against bacillary dysentery (Rai *et al* 1998). Table-2 gives a picture of the ethnomedicinal plant species recorded from Neora Valley National Park.

2. Ethno-ornamental Plants: A large number of plant resources were noted to be ornamentals, the species being the important resources for ornamentals in houses, and especially for their festive occasions. Many of them have already found the important

Table - 2 : Ethnomedicinal plants recorded from the Neora Valley National Park.

Name of Plants	Family	Local Name	Ailments	Parts in use and preparation
Achyranthes bidentata Blume	Amaranthaceae	Ankhlay Jhar	Rheumatism, gout	Root & stem decoction
Acorus calamus L.	Araceae	Bojho	Skin diseases	Rhizome paste
Ageratum conyzoides L.	Asteraceae	Ilamay	Cut-injury	Extract of terminal tender leaves
Artemisia indica Willd.	Asteraceae	Titepati	Injury, bleeding	Extract of leaf & inflorescence
Artemisia dubia Wallich *ex* Besser	Asteraceae	Titepati	Headache, nose-bleeding	Extract of leaf
Astilbe rivularis D. Don	Saxifragaceae	Buro-okhati	Tonic for post-natal women	Root
Artocarpus lacucha Buch.-Ham.	Moraceae	Barhar	Dysentery	Stem latex
Bauhinia vahlii Wight & Arn.	Caesalpiniaceae	Bhorla	Dysentery, laxative	Seeds & leaves
Bergenia ciliata (Haworth) Sternberg	Saxifragaceae	Pakhan-bet	Diarrhoea, fever, pulmonary infections	Root decoction
Betula alnoides D. Don	Betulaceae	Saur	Snake-bite	Bark paste
Boenninghausenia albiflora (Hook.) Meisn.	Rutaceae	_	Lice & other ecto-parasite infections extract	Young shoot
Boehmeria rugulosa Wedd.	Urticaceae	Daar	Snake-bite	Stem bark paste
Callicarpa arborea Roxburgh *ex* Clarke	Verbenaceae	Guenyhlo	Fevers, colic & skin disease	Extract of bark & leaves
Callicarpa vestita Wallich *ex* Clarke	Verbenaceae	Guenyhlo	-do-	-do-
Cannabis sativa L.	Cannabaceae	Ganja	Indigestion	Leaves & inflorescence
Cardamine hirsuta L.	Brassicaceae	Simrayo	Low blood pressure & cardiac problem	Shoot extract
Centella asiatica (L.) Urban	Apiaceae	_	Penumonia, fever	Shoot
Clematis acuminata DC.	Ranunculaceae	Pinasay lahara	Sinus pain	Roots
Clematis smilacifolia Wallich	-do-	-do-	-do-	-do-
Corydalis chaero-phylla DC.	Fumariaceae	_	Stomach-ache	Fruits
Corydalis geraniifolia Hook. f. & Thomson	-do-	_	-do-	-do-
Cotoneaster microphyllus Lindley	Rosaceae	Brush jhar	Used as stringent	Stolons

Name of Plants	Family	Local Name	Ailments	Parts in use and preparation
Cyperus rotundus L.	Cyperaceae	_	Used as stringent	Rhizome
Drymaria diandra Blume	Caryophyllaceae	Abijalo	Pneumonia, throat-pain, sinustitis	Shoots
Drymaria villosa Cham. & Schlecht.	-do-	-do-	-do-	-do-
Dicentra paucinervia Stern	Fumariaceae	_	Cardiac troubles	Shoots
D. scandens (D.Don) Walp.	-do-	_	-do-	-do-
Duchesnea indica (Andrews) Focke	Rosaceae	_	Oral sores	Fruits
Elsholtzia blanda (Bentham) Benth.	Lamiaceae	_	Gastritis	Extract of shoot
Eupatorium adeno-phorum Spreng.	Asteraceae	Kalijhar	External injuries	Leaf extract
Fagopyrum debotrys (D. Don) Hara	Polygonaceae	Ban Fapar	Abdominal pain, choleric diarrhoea	Grains & young shoots
Fraxinus floribunda Wallich	Oleaceae	Larikuri	Bone fracture	Bark
Girardinia diversifolia (Link) Fries	Urticaceae	Bhangre sisnu	Blood pressure	Inflorescence
Gynocardia odorata R. Brown	Flacourtiaceae	Gantay	Skin disease & Leprosy	Seeds oil
Hedera nepalensis K. Koch	Araliaceae	_	Sores	Latex
Heracleum nepalense D. Don	Apiaceae	Chimphi-ng	Influenze, bodyache	Inflorescence & fruits
Houttuynia cordata Thunb.	Saururaceae	_	Stomach disorder	Shoots
Hydrocotyle himalaica P.K. Mukherjee	Apiaceae	Golpata	Pneumonia, throat infection	Shoots
Hydrocotyle nepalensis Hook.	-do-	-do-	-do-	-do-
Hypericum uralum Buch-Ham. *ex* D. Don	Hypericaceae	Urilo	Wounds & bruises	Bark-juice
Laportea terminalis Wight	Urticaceae	Patle sisnu	Blood pressure	Inflorescence & tender leaves
Leucosceptrum canum Smith	Lamiaceae	Ghoorpis	Epilepsy, wounds	Roots, leaves
Litsea cubeba (Loureiro) Pers.	Lauraceae	Kaula	Stomach disorders	Flowers
Mahonia napaulensis DC.	Berberidaceae	Keshari	Dysentery	Fruits & stem bark
Mimosa pudica L.	Mimosaceae	Buarijhar	Tooth-ache	Roots
Mussaenda macrophylla Wallich	Rubiaceae	Dhobini phul	Jaundice	Root extracts
M. treutleri Stapf	-do-	Dhobini phul	-do-	-do-

Name of Plants	Family	Local Name	Ailments	Parts in use and preparation
Nephrolepsis tuberosa	Polypodiaceae	Paani Amala	Kidney troubles	Root tubers
Paederia foetida L.	Rubiaceae	Biri lahara	Tooth-ache	Leaves, stem
Panax pseudo-ginseng var. *angustifolius* (Burkil) Li	Araliaceae	Panch Pattay	Used as potent vitaliser	Rhizome
Panax pseudoginseng var. *bipinnatifidus* (Seeman) Li	-do-	-do-	-do-	-do-
Persicaria capitata (Ham.) H. Gross	Polygonaceae	_	Insect bites & stings	Shoots
Polygala arillata D. Don	Polygalaceae	Marcha	Boils	Root
Phyllanthus emblica L.	Euphorbiaceae	Amala	Indigestion	Frutits
Phytolacca acinosa Roxb.	Phytolaccaceae	_	High blood pressure	Leaves
Plantago erosa Wallich	Plantaginaceae	_	Tooth-ache	Leaves
Prunus cerasoides D. Don	Rosaceae	Arupatay	Bone-fracture & tooth-ache	Bark, stem
Rhamnus nepalensis (Wallich) Lawson	Rhamnaceae	Archal	Used as astrigent	Fruits
Rhamnus purpureus Edgew.	-do-	_	Used as purgative	-do-
Rhododendron arboreum Smith	Ericaceae	Lali Gurans	Blood dysentry, throat infection	Corolla
Rubia manjith Roxb. *ex* Flemming	Rubiaceae	Majito	Menstural disorder, chest troubles, boils & skin diseases	Roots & fruits
Rubia wallichiana Dec.	Rubiaceae	-do-	Jaundice, paralysis	Shoots
Rubus ellipticus Smith	Rosaceae	Ainselu	Fever	Roots
Rubus lineatus Blume	-do-	-do-	Food poisoining	Roots
Rumex nepalensis Spreng.	Polygonaceae	Halhalay	Skin diseases	Shoots
Scoparia dulcis L.	Scrophulariaceae	-	Diabetes	Young leaves
Skimmia laureola (DC.) Walp.	Rutaceae	Jainberi-phul	Aromatic	
Schima wallichii Korthals	Theaceae	Chilaune	Anthetmintic	Barks
Sida acuta Burm. f.	Malvaceae	_	Bone fracture, boils	Shoots.
Stephania glandulifera Miers	Menispermaceae	Tamarke	Liver trouble & jaundice	Root tuber
Swertia chirayita (Flemming) Karsten	Gentianaceae	Chireto	Dyspepsia, fever, headache	Shoots

Name of Plants	Family	Local Name	Ailments	Parts in use and preparation
Taxus baccata L.	Taxaceae	Dhengre salla	Stomach-ache, cough	Aril
Terminalia chebula Retz.	Combretaceae	Harra	Cough, indigestion, heart disease	Fruits
Evodia trichotoma (Lour.) Planch.	Rutaceae	Khanak-pa	Typhoid, indigestion	Fruits
Thalictrum foliolosum DC.	Ranunculaceae	_	Used as tonic and purgative	Roots
Thalictrum javanicum Blume	-do-	_	-do-	-do-
Tiarella polyphylla D. Don	Saxifragaceae	_	Tuberculosis	Flowers
Urtica ardens Link.	Urticaceae	Sisnu	Cardiac troubles & blood pressure	Flowers & Roots
Valeriana hardwickii Wallich	Valerianaceae	_	Epilepsy neurosis, colic	Roots
Viola biflora L.	Violaceae	_	Used as emetic, antiseptic	Roots & Flowers
Viola diffusa Gingins	-do-	_	Chest pain	Flowers
Viola pilosa Blume.	-do-	_	Used as febrifuge & ematic	Shoot
Viscum nepalense Spreng.	Loranthaceae	Harchur	Body-pain, fracture, fever	Stem decoction

places in the nurseries and gardens. Many of these potential ornamentals are now domesticated and also in trade. Table-3 enumerates the ethno-ornamental species of plants from Neora Valley National Park.

3. Ethno-edible Plants: The Forests of Neora Valley are also rich in wild edible species, which are commonly collected by local tribals for their food. It is observed that the people living in the fringe areas of National Park survive on these wild edible resources of the valley, specially during the time of food-shortage. Collections from the wild and sale in the local market were also observed. In true sense, many of these wild species have the potentiality for cultivation and marketing for their nutritive value. Commonly collected wild edible plants of Neora Forests have been enumerated in Table-4.

4. Poisonous Plant species: The recorded poisonous plant species exhibited a wide spectrum of poisonous effects on men and other animals depending upon the seasons, method of administration and the part of the plant used. Some of these are deadly poisonous for animals like cattle, fishes, etc. while many are fatal to human being. The different parts of an individual species may be having different usage or poisonous effect. For example, the fruits of *Cucumis sativa* are edible, whereas its roots are poisonous. Table 5 depicts some poisonous plants recorded from Neora Valley, which are categorized as irritants and lethal poisons.

5. Important Fodder Plant species of the Park : The Neora Valley National Park also harbours quite a large number of fodder plant species for the cattle, ponies, goats and pigs. Some of these fodder plants are reported to be very interesting, for example the foliage of *Ficus subincisa*, when given to the milking cows is believed to stimulate the body metabolism of the cows and enable cows to produce more milk. Thus, even amongst many fodder plant species in the valley, some were really found to be the much preferred fodder and choice of the people for their cattle. However, most of the grasses are collected by local people along with numerous herbaceous plants. Table-6 listed below comprises only few of the important fodder plant species from the valley.

6. Plants of other assorted ethnic use: A large number of plant species of Neora Valley National Park were recorded to be having values in assorted ethnic uses. Many household commodities, utensils and cultural instruments, etc. are made from these wild species. The rich culture and tradition of the hill people are related to the natural resources, especially the plant resources, and there are good numbers of such plant species in Neora Valley. Many of these species are used in religious rituals, some in marriage ceremonies, prayers and 'puja' offerings etc. and quite a few number are traditionally used in festive occasions. Thus, the forest patches of Neora Valley also harbour many plant species related to the life processes of the hill people. The twigs and sticks of some such plants are used in pujas, marriages whereas the roots-bulbs or tubers of others are used to make pots or containers for various domestic purposes. Durable traditional wooden containers,

Table - 3. Ethno-ornamental species of plants found in Neora Valley National Park

Name of the Plants	Families	Local Name	Flowering Period	Habit Types
Acer thomsonii Miq.	Aceraceae	Melo-kapasi	Otc.- Nov.	Ornamental tree
Aeschynanthes bracteatus Wallich	Gesneriaceae	_	Jul. - Sep	Epiphytic shrub
Arisaema griffithii Schott	Araceae	Sanp ko Makai	Mar.- Apr.	Flowering herb
A. speciosum (Wallich) Mart. *ex* Schott	-do-	-do-	May - Jun.	-do-
Begonia picta Smith	Begoniaceae	Mager-kanjay	Aug.- Sep.	Foliage plant
B. sikkimensis A. DC.	-do-	-do-	Jan. - Apr.	-do-
Berberis hookerii Lam.	Berberidaceae	Chutro	Apr.- Jun.	Flowering shrub
Buddleia asiatica Lour.	Buddlejaceae	Bhairung-pati	Jan. - Apr.	Flowering shrub
Daphniphyllum himalayense (Benth.) Muell.	Asclepiadaceae	Lal Chandan	May - Aug.	Ornamental tree
Duranta repens L.	Verbenaceae	_	Apr.- Jun.	Flowering shrub
Hoya linearis Wallich *ex* D. Don	Asclepiadaceae	_	Sep.-Oct.	Pendulous flowering herb
Melastoma malabathricum L.	Melastomataceae	Chulesi	May - Jul.	Flowering herb
Michelia doltsopa DC.	Magnoliaceae	Rani chanp	Apr. May	Ornamental tree
Primula denticulata Smith	Primulaceae	_	May-Jun.	Flowering herb
Prunus napaulensis (Ser.) Steud.	Rosaceae	Arupatay	Apr. May	Ornamental tree
Rhaphidophora glauca (Wallich) Schott	Araceae	Kanchirna	May - Nov.	Climber
Rhododendron arboreum Smith	Ericaceae	Lali Gurans	May - Jun.	Ornamental tree
R. grande Wight	-do-	Chimal	May-Apr.	-do-

Table - 4. Some important ethno-edible plant species of Neora Valley National Park

Name of the Plant	Family	Local Name	Habit Class	Edible Part
Aconogonum molle (D. Don) Hara	Polygonaceae	Thotney	Shrub	Young stem
Actinidia strigosa Hook. f. & Thomson	Actinidiaceae	Thekiphal	Liana	Fruits
Artocarpus lacucha Buch.-Ham.	Moraceae		Tree	Fruits
Astilbe rivularis D. Don	Saxifragaceae	Buro okhati	Perennial Herb	Roots
Bauhinia purpurea L.	Caesalpiniaceae	Tanki	Tree	Flowers
Bauhinia vahlii Wight & Arn.	Caesalpiniaceae	Bharla	Liana	Seeds
Cardamine hirsuta L.	Brassicaceae	Shimrayo	Annual Herb	Young shoot
Castanopsis hystrix Miq.	Fagaceae	Katus	Tree	Seeds
Castanopsis tribuloides (Smith) A. DC.	Fagaceae	-do-	Tree	Fruits
Choerospondias axillaris (Roxb.) Burtt & Hill	Anacardiaceae	Lapsee	Tree	Fruits
Corylus ferox Wallich	Betulaceae		Tree	Fruits
Dendrocalamus hamiltonii Nees & Arn. *ex* Munro	Poaceae	Choya Baans/ Taama	Shrub	Fruits
Dioscorea spp.	Dioscoreaceae	Gittha-vyagur	Geophytic climber	Tubers
Elaeagnus conferta Roxb.	Elaeagnaceae	Mallero	Shrubby climber	Fruits
Elaeocarpus lanceifolius Roxb.	Elaeocarpaceae	Bhadrasay	Tree	Fruits
Elaeocarpus sikkimensis Masters	Elaeocarpaceae	Bhadrasay	Tree	Fruits
Fagopyrum debotrys (D. Don) Hara	Polygonaceae	Ban Bharay	Annual Herb	Young shoot
Ficus benjamina L.	Moraceae	Kabra	Tree	Unopened leaf buds
Ficus auriculata Lour.	Moraceae	Nebhara	Tree	Fruits
Gaultheria hookerii Clarke	Ericaceae	Kaligeri	Shrub	Fruits
Girardinia diversifolia (Link) Friis	Urticaceae	Bhangray sisnu	Shrub	Young shoot
Gynocardia odorata R. Brown	Flacourtiaceae	Gantay	Tree	Seeds
Holboellia latifolia Wallich	Lardizabalaceae	Gofla	Shrubby climber	Fruits
Fragaria daltoniana Gay	Rosaceae		Annual Herb	Fruits

Name of the Plant	Family	I ocal Name	Habit Class	Edible Part
Fragaria nubicola Lindley *ex* Lacaita	Rosaceae		Annual Herb	Fruits
Laportea terminalis Wight	Urticaceae	Patley sisnu	Annual Herb	Young shoot
Litsea cubeba (Loureiro) Pers.	Lauraceae	Siltimbur	Tree	Fruits
Morus australis Poir.	Moraceae	Sano kimbu	Tree	Fruits
Mangifera sylvatica Roxb.	Anacardiaceae	Chuchay Aanp	Tree	Fruits
Murraya koenigii (L.) Spreng.	Rutaceae		Shrub	Leaves
Myrsine semiserrata Wallich	Myrsinaceae		Tree	Fruits
Nasturtium officinale Brown	Brassicaceae	Simrayo	Annual Herb	Shoots
Oxalis corniculata L.	Oxalidaceae	Chariamailo	Annual Herb	Leaves
Pentapanax leschnaultii (DC.) Seeman	Araliaceae	Chinday	Epiphytic Shrub	Young shoot
Persea fructifera Kosterm.	Lauraceae		Tree	Fruits
Prunus napaulensis (Ser.) Steud.	Rosaceae	Arupatay	Tree	Fruits
Prunus cerasoides D. Don	Rosaceae		Tree	Fruits
Rumex nepalensis Spreng.	Polygonaceae	Halhalay	Perennial Herb	Young shoot
Smilax ovalifolia Roxb.	Smilacaceae	Kukurdainay	Shrubby climber	Fruits
Phyllanthus emblica L.	Euphorbiaceae	Amala	Tree	Fruits
Phytolacca acinosa Roxb.	Phytolacceacea		Annual Herb	Shoot
Piper mullesua D. Don	Piperaceae		Perennial Herb	Fruits
Rhamnus nepalensis (Wallich) Lowson	Rhamnaceae		Tree	Fruits
Rhus semialata Murray	Anacardiaceae	Bhakimlo	Tree	Fruits
Rosa sericea Lindley	Rosaceae		Shrubby climber	Fruits
Rubus calycinus Wallich *ex* D. Don	Rosaceae		Perennial Herb	Fruits
Rubus elliptics Smith	Rosaceae	Ainselu	Shrubby climber	Fruits
Rubus niveus Thunb.	Rosaceae	Ainselu	Shrubby climber	Fruits
Rubus indotibetanus Koidzumi	Rosaceae	Ainselu	Shrubby climber	Fruits
Schisandra grandiflora (Wallich) Hook. f. & Thomson	Schisandraceae	Thekiphal	Shrubby climber	Fruits
Schisandra neglecta Smith	Schisandraceae	Thekiphal	Shrubby climber	Fruits

Name of the Plant	Family	Local Name	Habit Class	Edible Part
Sorbus vestita (Wallich *ex* G. Don) Lodd.	Rosaceae	-	Tree	Fruits
Syzygium cumini (L.) Skeels	Myrtaceae	-	Tree	Fruits
Syzygium tetragonum (Wight) Walp.	Myrtaceae	-	Tree	Fruits
Terminalia chebula Retz.	Combretaceae	Harra	Tree	Fruits
Terminalia bellirica (Gaertner) Roxb.	Combretaceae	Barra	Tree	Fruits
Evodia trichotoma (Loureiro) Planch.	Rutaceae	Khanakpa	Tree	Fruits
Urtica dioica L.	Urticaceae	Ghario sisnu	Shrub	Young shoot
Viburnum erubescens Wallich & DC.	Caprifoliaceae	Asaray	Shrub	Fruits

Table - 5. Poisonous plants of Neora Valley National Park

Name of the Plants	Families	Poisionous Parts
IRRITANTS		
Girardinia diversifolia (Link) Fries	Urticaceae	Stinging hairs
Clematis gouriana DC.	Ranunculaceae	Stem & leaves juice
Ranunculus diffusus DC.	Ranunculaceae	Leaf juice
Laportea terminalis Wight	Urticaceae	Stinging hairs
Dendrocnide desinuata (Blume) Chew	Urticaceae	Stinging hairs
Rhus succedanea L.	Anacardiaceae	Stem & leaf juice
Mucuna macrocarpa Wallich *ex* Baker	Papilionaceae	Fruit bristles
Urtica ardens Link	Urticaceae	Stinging hairs
LETHAL POISONS		
Berberis insignis Hook.f. & Thomson	Berberidaceae	Stem juice(poisonous for fish)
Cannabis sativa L.	Cannabaceae	Shoots & flowers
Cestrum aurantiacum Lindley	Solanaceae	Shoots (poisonous for goat)
Codonopsis affinis Hook. f. & Thomson	Campanulaceae	Shoots
Gnaphalium luteo-album L.	Asteraceae	Shoots (poisonous for cattle)
Lyonia ovalifolia (Wallich) Drude	Ericaceae	Shoots (poisonous for cattle)
Rhododendron falconeri Hook. f.	Ericaceae	Bark & leaves (poisonous for fish)
Semecarpus anacardium L. f.	Anacardiaceae	Bark & leaf juice
Schima wallichii Korthals	Theaceae	Bark
Solanum nigrum L.	Solanaceae	Fruit
Pieris formosa (Wallich) D. Don	Ericaceae	Young shoot
Phytolacca acinosa Roxb.	Phytolaccaceae	Root
Trichosanthes lepiniana (Naudin) Cogniaux	Cucurbitaceae	Seeds

milk-curd pots, flower-vase etc. are prepared by various ethnic communities from the trunk of some species of trees. Charcoal is one very important article in their domestic life, which is prepared from the wood of a large number of plants. Similarly, they need bamboo for numerous purposes and they use all the available species of bamboo. Therefore, Neora Valley National Park embodies several species of plant having great ethnic importance, which form the indispensable parts of the regular activities of the different ethnic hill communities. Some examples are as follows (Table-7):

Many of the recorded medicinal plants or their products are available in the local markets of Darjeeling, Kurseong, Kalimpong, Sikkim, and also in the markets of Terai and Duars. As reflected from the study, the doses and the mode of administration etc. were also varying from place to place and community-wise. Some plants were found to have multifarious usage being medicinal, edible as well as in many other domestic works. On the contrary, some species being medicinal were also equally poisonous or fatal if

not administered properly and in appropriate dose.

It is agreeable that despite the vast scientific progress and achievements in the field of medicines, these therapeutic plants are yet to be recognized as valuable source of health care which are providing incredible health services to the rural people in the remotest

Table - 6: Important fodder plant species of Neora Valley National Park

Name	Family	Local Name
Arisaema speciosum (Wallich) Mart.	Araceae	Mongjing
Betula utilis D. Don	Betulaceae	Bhujpat
Boehmeria hamiltoniana Wedd.	Urticaceae	Kamlay/ Chiplay
Brassaiopsis mitis Clarke	Araliaceae	Chuletro/ Phootta
Callicarpa arborea Roxb. *ex* Clarke	Verbenaceae	Guenlo
Celtis tetrandra Roxb.	Ulmaceae	Khari
Cephalostachyum capitatum Munro	Poaceae	—
Colocasia esculenta (L.) Schott	Araceae	Mane
Eurya acuminata DC.	Theaceae	Sano Jhinguni
Ficus auriculata Lour.	Moraceae	Nebara
Ficus neriifolia Smith	Moraceae	Dudhilo
Ficus subincisa Buch.-Ham. *ex* Smith	Moraceae	Garulay
Garuga gamblei King *ex* Smith	Burseraceae	Dabdabay
Glochidion acuminatum Muell.-Arg.	Euphorbiaceae	Lalikaath
Grewia eriocarpa Juss.	Tiliaceae	Syalphusray
Litsea elongata (Nees) Hook. f. var. *latifolia* Cowan & Cowan	Lauraceae	Thulo Pahenlay
Mallotus philippensis (Lam.) Muell.	Euphorbiaceae	Sinduray
Nayariophyton zizyphifolium (Griff.) Long & Miller	Malvaceae	Kubinday
Parthenocissus semicordata (Roxb.) Planch.	Vitaceae	Charcharay Lahara
Persicaria chinensis (L.) H. Gross	Polygonaceae	Ratnewlo
P. chinensis (L.) H. Gross var. *brachiata* (Lammers) Hara	Polygonaceae	Ratnewlo
P. runcinata (D. Don) H. Gross	Polygonaceae	Ratnewlo
Saurauja napaulensis DC.	Saurauiaceae	Gagun
Setaria intermedia Roem. *et* Schult.	Graminae	—
Shuteria involucrata (Wallich) Wight & Arn.	Papilionaceae	—
Tetrastigma serrulatum (Roxb.) Planch.	Vitaceae	Charcharay
Triumfetta rhomboidea Jacq.	Tiliaceae	Bhenre Kuro
Turpinia nepalensis Wallich *ex* Wight & Arn.	Staphyleaceae	Thali
Yushania maling (Gamble) R. Majumdar	Poaceae	Malingo

Table - 7. Plants of assorted use by the ethnic communities living around Neora Valley National Park

Names of Plants	Families	Local Names	Useful Parts	Uses
Abrus precatorius L.	Papilionaceae	Lalgeri	Seeds	Jeweller's unit of weight (reti); prepare necklaces as ornament
Acer laevigatum Wallich	Aceraceae	Putli	Trunk	House-building and for making agricultural implements.
Bauhinia vahlii Wight & Arn.	Caesalpiniaceae	Borla	Leaves	Plates for taking food, also for making 'ghooms' - a traditional umbrella
Bombax ceiba L.	Bombacaceae	Simal	Fruit	Floss from fruit used in pillows
Cucurbita pepo L.	Cucurbitaceae	Kubindo	Hard dried rind of fruits	Making *Sarangi*, a musical instrument
Daphne bholua D. Don	Thymeliaceae	Kagate	Bark	Much valued traditional paper.
Dioscorea hamiltonii Hook.f.	Dioscoreaceae	Ban Tarul	Tuberous root	A small piece of tuber fix on the forehead as *Tika* during *maghay sankranti* festival after taking bath in early morning
Edgeworthia gardnerii (Wallich) Meisn.	Thymeliaceae	Kagate, Argayle	Bark	Much valued traditional paper.
Elaeocarpus sphericus (Gaert.) Schum.	Elaeocarpaceae	Rudrakshay	Stones from fruits	Customary rosary is made from the stone of its fruits and worn around neck as well as other parts of the human body; believed to be repellant of evil spirits and ill-luck.
Eurya cavinervis Vesque	Theaceae	Jhingni	Trunk	House-posts and flag-staffs
Girardinia diversifolia (Link) Friis	Urticaceae	Bhangre	Sishnu	Bark extracted fibre used for making ropes, rough cloths, etc.
Hedyotis scandens Roxb.	Rubiaceae	Bokri lahara	Ripe Fruits	Women use ripe fruits to blacken their teeth.
Mahonia napaulensis DC.	Berberidaceae	Keshari	Stems	Used to make handles of sickle, khukuri etc.
Mallotus philippensis (Lam.) Muell.	Euphorbiaceae	Sindure	Red coating on fruit	Used as vermilion and red dye.

Names of Plants	Families	Local Names	Useful Parts	Uses
Oroxylum indicum (L.) Vent.	Bignoniaceae	Totola	Seeds	Religious; used as page mark in religious books; offered to deity; prepare 'khada' to honor priests; etc.
Ostodes paniculata Blume	Euphorbiaceae	Bepari	Gum	Gum exudates through bark used in paper makin
Pericampylus glaucous (Lamm.) Merrill	Menispermaceae	Pipal-Patay Lahara	Shoots	Its branches are used as ropes in domestic work
Polygala arillata D. Don	Polygalaceae	Guliyo Jara	Roots	Used to prepare starter culture *Marcha,* an additive, for the fermentation of local millet beer
Prunus cerasoides D. Don	Rosaceae	Painyoon	Slender branches	Sticks and twigs are used invariably in Hindu worships and marriages in Nepali society
Pterospermum acerifolium (L.) Willd.	Sterculiaceae	Hatti Pahenle	Leaves	Used as dinner plates (*Tapara*)
Rhododendron arboreum Smith	Ericaceae	Lali Guras	Wood	Handle for Kukri
Rhododendron falconeri Hook.f.	Ericaceae	Korlinga	Leaf	For wraping butter produced from yak milk in high altitude
Rhus chinensis Miller	Anacardiaceae	Bhakimlo	Twigs	Used as sticks in popular Nepali cultural festival *Deosi-song*
Rhus hookeri Sahni & Bahadur	Anacardiaceae	Kaag Bhalayo	Stem exudates; seeds	Stem exudates produce irritating blisters on skin; to immune against blisters its seeds and stems are burnt to produce smoke and allowed new-born baby to inhale during naming ceremony
Rubia manjith Roxb.	Rubiaceae	Majito	Fruits	Produce yellowish red dye; used as nail-polish and mehandi by teen-agers and as colouring ink.
Schima wallichii (DC.) Korthals	Theaceae	Chilaune	Trunk	House-building and ploughshares
Stephania glandulifera Miers	Menispermaceae	Tamarkay	Root-bulb	Chopped to make a bowl, used as drinking pot for poultry; believed to keep the fouls free from diseases
Sterculia villosa Roxb.	Sterculiaceae	Odal	Bark	Making ropes
Styrax serrulatum Roxb	Styracaceae	Khari	Stem	Prayer poles

and far-flung areas, where the modern health facilities are completely out of reach. The local *vaidyas, faith healers* and the practitioners in many other *traditional systems of medicines* (TSM) practicing their knowledge based on the plant elements were the once unquestioned doctors and/or authorities in the field of medicine. Even today, in most of the remote places, people have their own ethno-systems for the management of common ailments, and thereby maintain a unique science of ethno-medicine, which needs thorough documentation and scientific evaluation.

Many plants used as food in this part of the Himalayas are now becoming popular even among the non-tribals and are marketed throughout. All these plants are not available in the forest in required quantity, so low scale cultivation of some plants may be beneficial for the society.

The authors feel an urgent need for developing an integrated approach for conservation and effective and sustainable utilization of these valuable ethnobotanical resources with the objective of ensuring food security, source of revenue generation, management of health, promotion of folk art, etc. The advantages such as wider phenological attributes and the greater soil adaptability of these plant resources need to be suitably utilized with the up-to-date technological and scientific efforts.

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