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In silico documentation of medicinal plants in Lacchiwala range, Dehradun forest division, Uttarakhand (India)

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ABSTRACT

The Himalaya is the treasure house of natural wealth, particularly of medicinal plants. The drugs from different plant species have been known to the Indian physician since long - long ago. A number of important herbal preparations are described in the Indian system of medicine i.e. the Ayurveda. Ayurveda has described in its text more than three thousand herbs and quite a large number of them are found in the Himalaya. The study of the intrinsic relationship of the *Homo sapiens* to plants, form the subject matter of Ethnobotany; if one goes carefully through the science of Ayurveda, in one perspective, one would find exactly a similar relationship between man and medicinal plants.

Indigenous traditional knowledge of medicinal plants and therapies of various local communities has been lost due to changes in traditional culture and introduction of modern technologies. It is essential to compile the regional medicinal plants of the areas where there is a severe threat to natural vegetation owing to human inhabitation. In that sense, knowledge of the flora of medicinal herb in study area is also equally important. Several experts have conducted botanical survey in the Garhwal region. But these surveys have not been particularly directed towards medicinal plants used in Ayurveda. The present study deals with the documentation of medicinal plants used in Ayurveda of Lacchiwala range, Dehradun Forest Division, Doiwala, Dehradun, Uttarakhand with an aim to extend the knowledge about these plants.

Keywords: Ayurveda, Traditional Knowledge, Therapeutical, Medicinloraal Plants, Ayurvedic formulations.

INTRODUCTION

Ayurveda, the ancient science of life in its broader and comprehensive holistic approach deals with the human's healthy and long life with its original contribution of natural resources specially plants. We may say that various herbs were known to Indian Physicians in the hoary past. In the same tune we would like to emphasize that all the Ayurvedic classics describe several medicinal plants covering the entire aspect of therapeutical action and uses towards different diseases which may be considered as to be the boon to the modern medical science. Ayurveda is extensively used in modern India and is fast proliferating in its International appeal. In the recent years Ayurveda has become a victim of Biopiracy, therefore its protection and preservation has become a matter of serious concern for India.

India is one of the 12 mega biodiversity [1]. The Indian Himalayan region alone supports about 18,440 species of plants [2]. Uttarakhand is the state located at the foothills of the snow clad Himalayas with lush green vegetation. There is a diverse range of flora and fauna. The vegetation of the state ranges from tropical deciduous to alpine; broadly categorized mainly into three types i.e. Sub-Tropical Zone, Temperate Zone and Alpine Zones [3]**.** It is a store house of variety of herbs including different Ayurvedic medicinal plant species. The state has nearly 700 species of medicinal plants used in traditional system of medicine [4].

But in the lack of proper knowledge about of these precious medicinal plants and their therapeutical uses, these have been lost and some commercially important Ayurvedic medicinal plant species are facing threat due to habitat degradation over exploitation and unsustainable harvesting. Therefore, there is an urgent need for conservation of such species for sustainable development.

The study area i.e. block Vanva-3, Lacchiwala range of Dehradun Forest Division, Doiwala, Uttarakhand (India) is situated on height of 484 meters above sea level, the area falls in Sub-Tropical Zone of Uttarakhand (Fig.1). The sub-tropical zone has pure as well as mixed forests of *Shorea robusta* (Sal), *Dalbergia sisso* (Shisham), *Syzygium cumini* (Jamun), *Mallotus philippinensis* (kampilak), *Mitragyna parvifolia*, *Terminalia chebula*, various Ficus species, *Callicarpa macrophylla*, *Bauhinia*

variegata (Kachnar), *Bombax ceiba* (Semal), *Holoptelea integerifolia* (Puti Karanj), *Cassia fistula* (Aragvadha), *Nyctanthes arbortristis* (Parijat) etc. The shrubby vegetation is represented by *Murraya koenigii*, *Carissa carandas*, *Adhatoda vasica*, *Jasminum multiflorum*, *Solanum nigrum*, *Callicarpa macrophylla*, *Calatropis procera*, *Calatropis gigantia* etc [5].

Significances of medicinal plants

Wider socio-economic implications, potential discovery and formulation of new drugs have led to increased demand of wild medicinal plants (MPs) all over the world. Medicinal and aromatic plants constitute the basis of primary health care for a majority of the population and are a critical source of income for many rural people particularly in area near forests. They are a source of primary health care for more than 80% of the population in developing countries [6] who are dependent on traditional systems of medicine as these are culturally appropriate, technologically simple, economically affordable and generally effective systems with little or no side effects. Most of the modern medicines are produced indirectly from medicinal plants. As well as plants or their parts are directly used as medicines by a majority of community in all around the world and usually they have no side-effects. India has rich traditional systems of medicine as Ayurveda which provides a holistic health care encompassing promotive, preventive and curative aspect. Today about 65% of the population of India depended on the traditional system of medicine [7]. Medicinal plants are a major source of employment also and account for about 35 million man-days of employment in collection and processing every year.

MATERIAL METHOD

Present study is based on extensive and intensive field surveys made during 2010 to 2011. Whole area was visited (Fig. 1) for identification of different traditional medicinal plant species. The facts were collected after proper identification of the plant species with the help of floras and status of these plant species were noted from the IUCN Red list of threatened species (http://www.iucnredlist.org/). The collected information was re-examined by consulting important works pertaining to medicinal plants and identification of medicinal plant species was made with the help of classic literature and experts of Dravyaguna vigyan (Pharmacology and materia medica). Listing of plants of study area and search their therapeutical uses from different classics and modern Ayurvedic texts are important tools. The aim of study is documenting medicinal plant in forest area Vanva-3, Lacchiwala range, DFD, Dehradun. This study will be of a great help to research students, and pharmaceutists of both Ayurveda and allied medical sciences as well as other working on herbal flora.

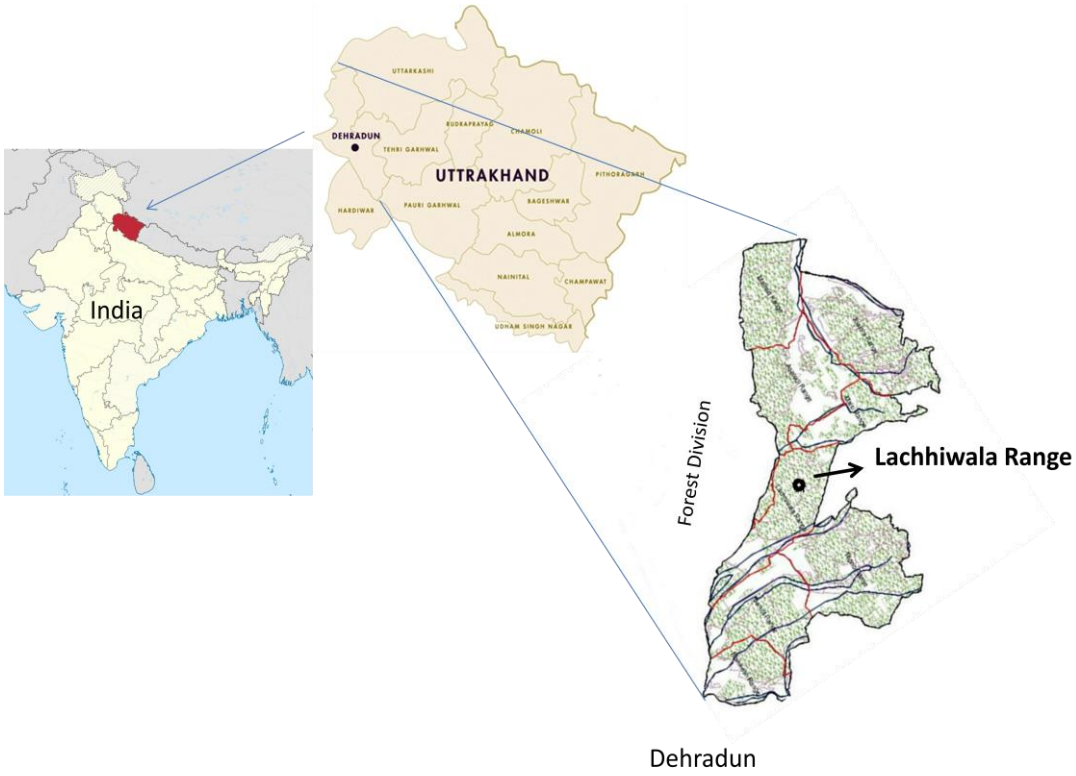

Figure1: Lacchiwala range, Dehradun forest division, Uttarakhand

RESULTS AND DISCUSSION

The results of the survey are presented in two Tables. Table-1 contains latin name, habit, family and parts used of plant species, while table -2 includes their Sanskrit name, followed by therapeutical actions, uses and famous Ayurvedic formulations. A total of 117 Ayurvedic medicinal plant species found during the surveys. The species are arranged in alphabetical order.

These 111 plant species and 93 genera are belonging to 48 families. Maximum numbers of species were recorded from family Fabaceae 19 species followed by Apocyanaceae Verbenaceae (6 species each); Euphorbiaceae, Moraceae, Poaceae and Solanaceae (5 species each); Malvaceae (4 species); Acanthaceae Combretaceae, Convulvulaceae, Liliaceae and Rutaceae Lytheraceae (3 species each); Amaranthaceae Asteraceae, Menispermaceae, Cruciferae, Papaveraceae, Lamiaceae and Zingiberaceae (2 species each); Amaryldaceae, Asclepidaceae,

Bignoneaceae, Bixaceae, Cannabinaceae, Cappridaceae, Celestraceae, Cucurbitaceae, Cyperaceae, Dioscoreaceae, Fumaraceae, Meliaceae, Moringaceae, Myrsinaceae Myrtaceae, Nyctaginaceae, Nymphaceae, Oleaceae, Oxalidaceae, Plumbaginaceae, Sapindaceae, Saxiferagaceae, Sterculaceae, Umbelliferae and Urticaceae (1 species each) (Fig. 2). On the behalf of the qualitative analysis, the maximum species were of trees (47) followed by herbs (38), shrubs (13) and climbers (13) as depicted in Fig 3.

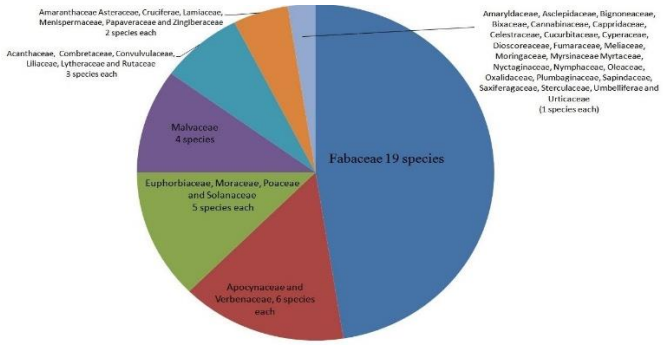

Figure 2: Dominant plant families of the Lacchiwala range (Uttarakhand)

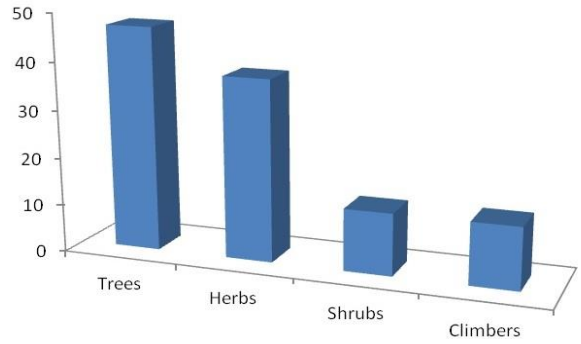

Figure 3: Habit-wise distribution of invasive species in Uttarakhand

On the basis of plant parts used, it was observed that roots of 37 species, leaves of 30 species, bark 26 species, fruits of 19 species, seeds of 18 species, whole plants of 12 species, flowers of 9 species, latex of 07 species, oil of 06 species, root bark 05 species, extract, stems, rhizomes an tubers 03 species each, resin of 02 species, fruit hair, fruit resin and heart wood of 01 species each (Fig. 4) used as medicine to cure various ailments. In most cases, two or more parts of the plants are used for medicinal purpose. We have documented different plants as possessing great medicinal potential (Fig. 5). The maximum numbers of plants are used to treat various skin disorders due to their association with the Human Immunodeficiency Virus and Acquired Immunity Deficiency Syndrome (HIV/AIDS).

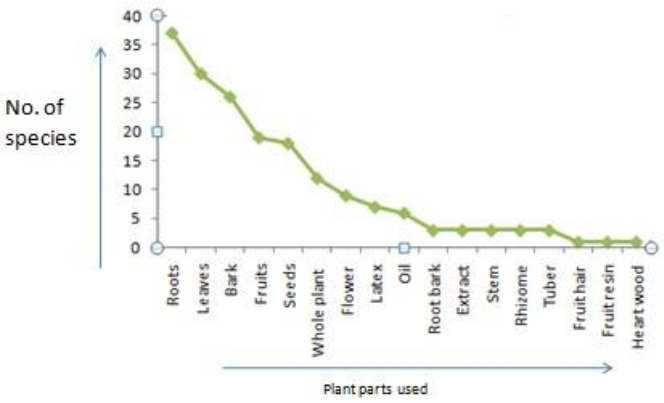

Figure 4: Statistics of plant parts used for various ailments.

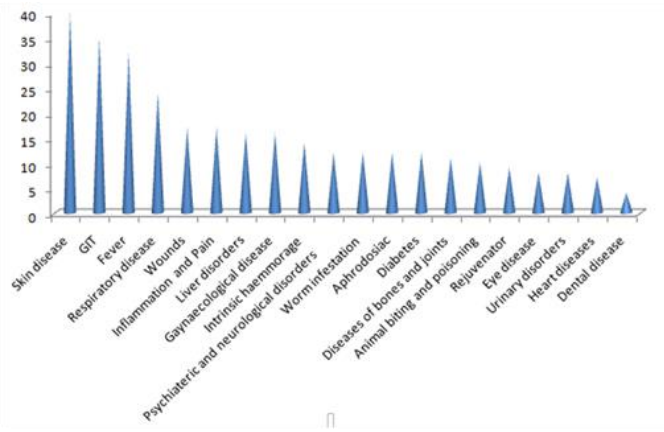

Figure 5: Number of plant speciesaccording their therapeutic uses

The study reveals that the study area have excellent potential for the production and sustainable harvest of plant species viz. *Justicia adhatoda, Withania somnifra, Boerhevia diffusa, Calatropis procera, Calatropis gigentica, kantkari, jakhiya, mitha neem, parpat, kakmachi, bhui amla, dugdhi, matasykshi, nirgundi, shivlingi*, vidari, *Dalbergia sissoo* (Shisam), *Kampilak, Shalmai, Palash, Terminalia bellirica, Terminalia chebula, Aegle marmelos, etc*. During survey it is also found that some commercially important medicinal plant species are facing threat due to habitat degradation over exploitation and unsustainable harvesting in the study area. Such as *Terminalia chebula, Tinospora cordifolia, Gloriosa superba* etc. whereas five species namely *Diospyros embryopteris, Mentha spicata, Pongamia pinnata Pierre, Saraca asoca Roxb.*and *Woodfordia fruticosa* Kurz.are in the Red list of threatened species.

Table 1: List of available Ayurvedic medicinal plants in study area.

Botanical Name	Family	Habitat	Part used	Status
Abrus precatorious L.	Fabaceae	Climber	Root, seed [8]	
Abutilon indicum L.	Malvaceae	Shrub	Root [9]	
Acacia catechu wild	Fabaceae	Tree	Heart wood[10]	
Achyranthes aspera L.	Amaranthaceae	Shrub	Root, whole plant[11]	
Accacia concinna	Fabaceae	Tree	Fruit[12]	
Adhatoda vasica nees	Acanthaceae	Herb	Root, Leaves, flower[13]	
Aegle marmelos Carr.	Rutaceae	Tree	Leaf, root, bark, fruit[14]	

Aloe vera	Liliaceae	Herb	Leaves[15]	
Albizzia lebbek Benth.	Fabaceae	Tree	Bark, seed, leaf, flower[16]	
Alstonia scholaris	Apocynaceae	Tree	Bark[17]	
Alternanthera sessilis L.	Amaranthaceae	Herb	Whole plant[18]	
Andrographis paniculata Nees.	Acanthaceae	Herb	Whole plant[19]	
Anethum sowa Kurz.	Umbelliferae	Herb	Fruit, oil [20]	
Argemone Mexicana Linn	Papavaraceae	Herb	Root, seeds [21]	
Argyreia speciosa	Convolvulaceae	Climber	Tuberous root [22]	
Arundo donax L.	Poaceae	Herb	Root[23]	
Asparagus racemosus	Liliaceae	Climber	Root[24]	
Bambusa arundinacea	Poaceae	Tree	Root, leaf, fruit, vansolochana (extract)[25]	
Barleria prionitis	Acantheceae	Shrub	Whole plant, leaf, root[26]	
Bauhinia variegata L.	Fabaceae	Tree	Bark, flower[27]	
Berginia ligualata	Saxifragaceae	Herb	Root[28]	
Bixa orellana Linn	Bixaceae	Tree	Leaves, Root, bark, fruit[29]	
Boerhavia diffusa Linn	Nyctaginacee	Herb	Root[30]	
Bombax ceiba Linn	Malvaceae	Tree	Thorn, root, resin, fruit, flower[31]	
Brassica Campestris L.	Crucifereae	Herb	Seed, oil[32]	
Brassica juncea (Zern& Coss)	Crucifereae	Herb	Seeds, oil[33]	
Butea monosperma Lam-Kutze	Fabaceae	Tree	StemBark, seeds, flower, gum[34]	
Calotropis gigantea	Apocynaceae	Herb	root, Latex, leave, flower[35]	
Calotropis procera (Ait.) Ait. fil.	Apocynaceae	Herb	root, leave, Latex, flower[36]	
*Callicarpa macrophylla Vah*L.	Verbenaceae	Shrub	Flower, fruit[37]	
Cannabis sativa L.	Cannabinaceae	Herb	Leaves, fruit[38]	
*Cassia angustifolia Vah*L.	Fabaceae	Tree	Leaves[39]	
Cassia fistula	Fabaceae	Tree	Leaves, fruit, bark[40]	
Cassia occidentalis L.	Fabaceae	Shrub	bark, root[41]	
Cassia tora sensu auct.	Fabaceae	Herb	Leaves, root[42]	
Celastrus panniculatus	Celastraceae	Climber	Seeds & oil, leaf[43]	
Cissampelos pareira L.	Menispermaceae	Climber	Root, rhizome[44]	
Clerodendrum infortunatum L.	Verbenaceae	Tree	Leaves[45]	
Clerodendrum phlomidis L.	Verbenaceae	Shrub	Leaves, root,bark[46]	
Coccinia indica	Cucurbitaceae	Climber	Leaf, root, fruit [47]	
Craateva nurvala Buch-Ham.	Capparidaceae	Tree	Bark, leaf[48]	
Cryptolepis buchanana Roem& Schult.	Asclepidaceae	Climber	Root[49]	
Curcuma longa L.	Zingiberaceae	Herb	Rhizome [50]	
Curcuma zedoaria Rosc.	Zingiberaceae	Herb	Rhizome [51]	
Cymbopogon martini Roxb.	Gramineae	Herb	Stem, leaves, flower, oil[52]	
Cynodon dactylon Pers.	Poaceae	Herb	Whole plant [53]	
Cyperus rotandus	Cyperaceae	Herb	Root[54]	
Dalbergia sissoo Roxb.	Fabaceae	Tree	Leaves, heart wood, bark, root[55]	
Datura metel L.	Solanaceae	Herb	Seed[56]	
Desmodium gangeticum DC	Fabaceae	Climber	root, whole plant[57]	
Dioscorea bulbifera L.	Dioscoreaceae	Climber	Tubers[58]	
Diospyros embryopteris	Ebenaceae	Tree	Bark, fruit, seeds, seedoil[59]	Vulnerable
Eclipta alba Hassk	Asteraceae	Herb	Whole plant [60]	
Embelia ribes Burm	Myrsinaceae	Tree	Fruit[61]	
Emblica officinalis Gaer tn.	Euphorbiaceae	Tree	Fruit[62]	
Euphorbia thymifolia L.	Euphorbiaceae	Herb	Whole plant[63]	
Ficus bengalensis Linn	Moraceae	Tree	Bark, latex, leaf, fruit, tender leaf, tender aerial root[64]	
Ficus glomerata Roxb.	Moraceae	Tree	Bark, latex, fruit[65]	
Ficus hispida Linn	Moraceae	Tree	Bark, fruit, latex[66]	

Ficus lacor Buch.-Ham.	Moraceae	Tree	Bark, leave[67]	
Ficus religiosa Linn	Moraceae	Tree	Bark[68]	
Fumaria vaillantii Loisel.	Fumariaceae	Herb	Whole plant[69]	
Gloriosa superb L.	Liliaceae	Herb	Tuber[70]	
Gmelina arborea L.	Verbenaceae	Tree	Root Bark[71]	
Helicteres isora	Sterculiaceae	Tree	Root,bark,fruit[72]	
Holarrhena antidysenterica L.	Apocyanaceae	Tree	Bark, fruit[73]	
Holoptelea integrifolia planch	Urticaceae	Tree	Bark, fruit[74]	
Ipomoea reniformis	Convolvulaceae	Herb	Whole plant[75]	
Lawsonia inermis L.	Lythraceae	Shrub	Leaf[76]	
*Mallotus philippinensis Muel*L. *Arg.*	Euphorbeaceae	Tree	Fruit resin[77]	
Melia azedarach L.	Meliaceae	Tree	Root, bark, fruit[78]	
Mentha spicata	Lamiaceae	Herb	Leaf [79]	Least concern
Mimosa pudica L.	Fabaceae	Shrub	Whole plant[80]	
Moringa oleifera Lam.	Moringaceae	Tree	Stem bark, fruit, seed.[81]	
Mucuna prurita Hook	Fabaceae	Climber	Seed, root, fruit hairs[82]	
*Murraya koenigii (*L.*)*	Rutaceae	Tree	Leaf [83]	
Nyctanthesarbor-tristis L.	Oleaceae	Tree	Leaf, bark[84]	
Ocimum sanctum L.	Lamiaceae	Shrub	Whole plant, leaf[85]	
Operculina turpethum L.	Convolvulaceae	Climber	Root[86]	
Oroxylum indicum	Begnoneacea	Tree	Root bark[87]	
Oxalis corniculata L.	Oxalidaceae	Herb	Whole plant[88]	
Papaver somniferum L.	Papaveraceae	Herb	seed, Latex[89]	
Phyllanthus urinaria L.	Euphorbiaceae	Herb	Whole plant[90]	
Plumbago zeylanica L.	Plumbagenaceae	Shrub	Rootbark[91]	
Pongamia pinnata Pierre	Fabaceae	Tree	Bark, leaf, seed, root[92]	Least Concern
Premna mucronata Roxb.	Fabaceae	Tree	Leaf, root[93]	
Pueraria tuberosa DC.	Fabaceae	Climber	Tuberous root[94]	
Punica granatum L.	Lythraceae	Tree	Fruit[95]	
Rauwolfia serpentine Benth exKurz.	Apocynaceae	Herb	Root[96]	
Ricinus communis L.,	Euphorbiaceae	Tree	Leaves, root, seed oil[97]	
Saccharum munja Roxb.	Graminae	Shrub	Root[98]	
Sapindus mukorossi Gaer tn.	Sapindaceae	Tree	Fruit [99]	
Saraca asoca Roxb.	Fabaceae	Tree	Stem Bark[100]	Vulnerable
Sida cordifolia L.	Malvaceae	Herb	Root[101]	
Sida rhombifolia	Malvaceae	Herb	Root[102]	
Solanum nigrum L.	Solanaceae	Herb	Leaves [103]	
Solanum surattense Burm.	Solanaceae	Herb	Root[104]	
Solanum torvum Swar	Solanaceae	Shrub	Root[105]	
Syzygium cumini L.	Myrtaceae	Tree	Stem bark, Seed[106]	
Tecona grandis L.	Verbenaceae	Tree	Bark, flower[107]	
Tephrosia purpurea Pers.	Fabaceae	Herb	Root[108]	
Terminalia arjuna Roxb.	Combretaceae	Tree	Stem bark[109]	
Terminalia bellirica Roxb	Combretaceae	Tree	Fruit[110]	
Terminalia chebula Retz	Combretaceae	Tree	Fruit[111]	
Tinospora cordifolia willd.	Menispermaceae	Climber	Stem[112]	
Vernonia cineria Less.	Asteraceae	Herb	Root[113]	
Vitex nigundo L.	Verbenaceae	Tree	Leaves, seed[114]	
Withania somnifera L.	Solonaceae	Herb	Root[115]	
Woodfordia fruticosa Kurz.	Lythraceae	Tree	Flower[116]	Low Risk
Wrightia tomentosa Roem.&Sceult	Apocynaceae	Tree	Leaf, Bark[117]	
Zanthoxylum armatum	Rutaceae	Shrub	Fruit, Bark[118]	

Table 2: Plants species followed by their samskrit names, medicinal uses and Ayurvedic formulations.

Botanical Name	Sanskrit name	Action/Uses	Ayrvedic formulations
Abrus precatorious L.	Gunja	Skin disease, eye disease, aphrodisiac,	Gunja bhadra ras[8]
Abutilon indicum L.	Atibala	Cardiac tonic, neural tonic, aphrodisiac,	Atibala tail, Narayan tail, Mahanarayan tail[9]
Acacia catechu Wild	Khadir	skin disorders, leprosy, coughing[10]	Khadiradivati, Khadirarishta[10]
Achyranthes aspera L.	Apamarga	Colic, piles, obesity, itching,[11] Toothache, Snake bite	Apamarga kshar tail, Apamarga kshar, Abhya lavan, Jyotishmati tail[11]
Accacia concinna	Shikakai	Hair tonic, liver disorder.[12]	Leaf powder[12]
Adhatoda vasica Nees	Vasa	Bronchitis, asthma, Bleeding Piles, fever, cough, Intrinsic haemorrhage[13]	Vasarishta, Vasachandanadi tail, Vasapanak,Vasavleha[13]
Aegle marmelos Corr.	Bilva	Diarrhea, sprue, indigestion, oedema[14]	Bilvadi gutika, Bilvadi churna, Dashmoolakwath[14]
Aloe vera	Kumari	Spleenomegaly, jaundice, burn, wound[15]	Kumaryasav, Rajpravartini vati[15]
Albizzia lebbek Benth.	Shirisha	Poisoning, eye disease, Hiccough and breathlessness.[16]	Mahasirishdi agad, Shirisharishta[16]
Alstonia scholaris	Saptaparna	Skin disease, wound, fever, asthma, poisoning, caries[17]	Saptaparna satvadi vati, Saptacchhadadi tail.[17]
Alternanthera sessilis L.	Matasyakshi	skin disease, blood disorders.[18]	Traikantak ghrita[18]
Andrographis paniculata Nees.	Bhunimba	Fever, skin disease, Liver disorder,worms[19]	Kalmegha navayas[19]
Anethum sowa Kurz.	Shatpushpa	Colic, Rejuvenator, Gout, piles, Disorders of female genital tract.[20]	Shatpushpa di kashaya, Lavangadya churn, Dill water[20]
Argemone Mexicana L.	Satyanashi	skin disorders, worm infestation[21]	Powdered root and seed[21]
Argyreia speciosa	Vriddhadaruk	Rejuvenator, lumbar spondylosis, filaria, eye disease, aphrodisiac,[22]	Vriddhdaruk sama churna, Narayan churn, Maharaja vati[22]
Arundo donax L.	Kasa	Fever, Retention of urine, erysipelas,rabies[23]	Trinpanchmula kwath, [23]
Asparagus racemosus	Shatavari	Aphrodisiac, Rejuvenator, beneficial for eyes, Intrinsic haemorrhage, Galactogogue, colic, epilepsy[24]	Shatavari churna, Shatavari ghrita, Brahm rasayan, Mahanarayan tail[24]
Bambusa arundinacea	Vamsha	Cough, amenorrhoea, urinary disorders, eye disease, piles, rabies[25]	Sitopladi churna, Talishadi churna[25]
Barleria prionitis	Saireyak	Cyst, nervous diseases, rat poisoning[26]	Sahcharadi Taila[26]
Bauhinia variegate	Kanchnar	Haemorrhagic disorders, cervical lymphadenopathy, piles, chicken pox[27]	Kanchnar guggulu[27]
Berginia ligualata	Pashanbheda	Diuretic, calculai, Urin disorders[28]	Pashanbheddya ghrita, Vidari ghrita[28]
Bixa orellana L.	Sinduri	Fever, jaundice[29]	
Boerhavia diffusa L.	Punarnava	Diuretic, Rasayan(rejuvenator), oedema, calculus, internal abcess.[30]	Punarnavashtak kwath Punarnavasav, Punarnava mandur[30]
Bombax ceiba Linn	Shalmali	Intrinsik haemorrhage, dysfunctional uterine bleeding, spleenomegaly, dioarhoea, [31]	Shalmali ghrita, Gangadhar churn[31]
Brassica Campestris L.	Sarshap	Skin disease, spleenomegaly, oedema, filariasis[32]	Sarshapadi pralep, Kushthadya tail [32]
Brassica juncea (Zern& Coss)	Rajika	spleenomegaly, enlargement of liver, skin disease[33]	Rajika oil[33]
Butea monosperma Lam-Kutze	Palash	Worm infestation, contraceptive, filariasis, dysentery, wound[34]	Palash kshar, palshbeejadi churna[34]
Calotropis gigentia	Alarka/ Madar	Asthma, cough, scabies, eczema, hyper pigmentation, Skin disease, splenomegaly, colic,[35]	Arka lavan, Arkatail[35]
Calotropis procera	Arka	Asthma, Itching, Skin disease, Piles, colic, Worm infestation, wounds, Dental disease[36]	Arkalavan, Mahavishgarbh taila, Dhanvantar ghrita[36]
Calilicarpa macrophylla Vahl.	Priyangu	Fever, diarrhea with Blood, Intrinsic haemorrhage, peptic ulcer[37]	Kumkumadi ghrita, Mahadrakshadi kwath, Priyangvadi tail, Priangvadi churna[37]
Cannabis sativa L.	Bhanga	Antispasmodic, Anticonvulsant, colic, insomnia, analgesic, appetizer, diarrhea.[38]	Jatiphaladi churna, Madananand modak[38] Jln505
Cassia angustifolia Vahl.	Swarnapatri	Laxative, constipation, fever, skin disease[39]	Shatasakar churna, Yashtyadi churna[39]
Cassia fistula	Aragvadha	Mild laxative, skin disease, ring worm,ulcer, rheumatoid arthritis,[40]	Aragvadhdi tail, Aragvadhdi leha, Aragvadharishta[40]
Cassia occidentalis L.	Kasmarda	Cough, skin disease, eczemz, filariasis, ring worm, psoriasis [41]	Kasmarda kwath[41]
Cassia tora L.	Chakramarda	skin disease, itching, fungal infection[42]	Dadrughni vati, Talkeshwara rasa,Vajrak tail, [42]
Celastrus panniculatus	Jyotishmati	Brain tonic, skin disease, amenorrhoea[43]	Jyotishmati tail, Vaidyanath vati[43]
Cissampelos pareira L.	Patha	Fever, anti toxic, diarrhea, piles, internal abcess[44]	Shad dharan yoga, Chandanadi lauh[44]
Clerodendrum infortunatum L.	Bhandir	Worm infestation, fever, diabeties[45]	Leaf juice[45]
Clerodendrum phlomidis L.	Tarkari	Rheumetide arthritis, diabeties, piles, inflammation [46]	Dashmoolarista,Chyvnprash[46]
Coccinia indica	Bimbi	Cough, fever, anemia, worms, lock jaw, bed wetting [47]	Bimbi ghrita[47]
Crateva nurvala Buch-Ham.	Varun	Urin disorders, calculus, wound, abcess[48]	Varunadi taila, Varunadi ghrita[48]

Cryptolepis buchanana Roem& Schult.	Jambu patra Sariva	skin disease, fever, cough, dyspnoea, ulcer	Sarivadi kwath, Sarivadyasav, Sarivadi vati [49]
Curcuma longa L.	Haridra	skin disease, fever, cough, wound, diabetes, anti toxic, jaundice, bronchial asthma[50]	Haridra Khanda[50]
Curcuma zedoaria Rosc.	Kachoor	Skin disease, worms,asthma, cough.[51]	Kachura tail[51]
Cymbopogon martini Roxb.	Rohish	Fever, cough,colic, coryza, head disease[52]	Rohishadi kwath, Dhanvantara ghrita[52]
Cynodon dactylon Pers.	Durva	Skin disorder, raktpitta (intrinsic haemorrhage), wounds, mennorhagia, erysipelas, vomiting, increase fertility[53]	Durvadya ghrita, Durvadi tail[53]
Cyperus rotandus	Mustak	Fever, Dysentery, indigestion[54]	Mustakadi churna, Shadang paniya, Mustakadi kwath[54]
Dalbergia sissoo Roxb.	Shinshapa	Eye disease, diarrhea, fever[55]	Vajrak tail, Mahakhadirika ghrita[55]
Datura metel L.	Dhattura	Fever, worms, rabies, alopecia[56]	Unmadgajankush, Sutshekhar rasa, kankasav[56]
Desmodium gangeticum DC	Shalparni	Hemicrania, arthritis, cardiac pain, aphrodisiac[57]	Shaliparnyadi kwath,[57] Dashmoolarishta, Dashmoolkwath
Dioscorea bulbifera L.	Varahi	Rejuvenator and nutritive, sinus, Aphrodisiac.[58]	Bhadravaha ghrita, Kumkumadi ghrita[58]
Diospyros embryopteris	Tinduk	Diarrhea, skin disorders, hiccough, burn, vitiligo.[59]	Kanadi kwath, Kapitthashtak churn[59]
Eclipta alba Hassk	Bhringaraj	Hair tonic, liver disorder, rejuvenator, inflammation, heart disease, anaemia.[60]	Nili bhrangadi taila, Bhrangamalkadi tail, Nili bhrangadi tail, Bhringrajasav [60]
Embelia ribes Burm	Vidanga	Abdominal pain, worm infestation[61]	Vidangarishta, viadang lauha
Emblica officinalis Gaer tn.	Amlaki	Rasayan (rejuvenator), beneficial for eyes, aphrodisiac, intrinsic haemorrhage, hyper acidity, diabetes[62]	Amalki rasayan, Dhatri loha, Chyavanprash, Triphala churna[62]
Euphorbia prostrata W.Alt.	Dugdhika	Diabetes, piles, skin disease, chronic cough, breathlessness, [63]	Gangasundar rasa[63]
Ficus bengalensis Linn	Vat	Wounds, intrinsic haemorrhage, Diarrhea, for conception, vomiting[64]	Nygrodhadi kwath, Ashtavakra rasa[64]
Ficus glomerata Roxb.	Udumbar	Wounds, intrinsic haemorrhage, Diarrhea, menorrhgia[65]	Udumbar sar[65]
Ficus hispida Linn	Kakodumbar	Rabies, menorrhagia, Vitiligo[66]	Kanchan gutika[66]
Ficus lacor Buch.	Plaksha	Wounds, piles, Diarrhea, leucorrhoea, bleeding disorder(raktapitta)[67]	Nygrodhadi kwath, Marm gutika[67]
Ficus religiosa Linn	Ashvatha	Wounds, Gout, Diabetes, Bleeding disorders, leucorrhoea,[68]	Nyogrodhadi churna, Nyogrodhadi kwath[68]
Fumaria vaillantii Loisel.	Parpat	Fever, vertigo [69]	Parpatadi ghrita, Shadangpaniya, Patoladi kwath, Chintamani rasa[69]
Gloriosa superb L.	Langali	Wound, abortifeceant, skin disease[70]	Kashisadi tail, langli rasayan[70]
Gmelina arborea L.	Gambhari	Gouty arthritis, fever, piles, intrinsic haemorrhage, fruit- aphrodisiac[71]	Dashmoolarishta, Shriparni tail, Dashmool kwath, Dashmula ghrita[71]
Helicteres isora	Avartani	Diarrhea, skin disease[72]	Fruit [72]
Holarrhena antidysenterica L.	Kutaja	Diarrhea, piles, ulcer, dysurea[73]	Kutajarista, kutaja awaleha[73]
Holoptelea integrifolia planch	Chirbilva	skin disease, diabetes, haemorrhides, vomiting[74]	Piyush valli rasa, Gandharvahastadi kvath[74]
Ipomoea reniformis	Akhukarni	Sterility, epilepsy[75]	Akhuparni kwath, Karpasadi taila[75]
Lawsonia inermis L.	Madyanti	skin disease, wound. Jaundice[76]	Madayantyadi churna[76]
Mallotus philippensis	Kampilak	Worm infestation, use as contraceptive, skin disease.[77]	Krimi ghatini gutika [77]
Melia azedarach L.	Mahanimba	Piles, fever, vomiting, anorexia, [78]	Arshoghni vati, Maha vishgarbh tail, Brihn manjishthadi kwath [78]
Mentha spicata L.Emend	Putiha	Anorexia, digestive, vomiting[79]	arkapudina[79]
Mimosa pudica L.	Lajjalu	Diarrhea, fever, gynecological disorder,wound[80]	Pushyanug churna, Samangadichurna, Kutaja avleha[80]
Moringa oleifera Lam.	Shobhanjan	Eye disease, wound, cyst, inflammation, liver disorder[81]	Shyamadi churna Sarasvat ghrita, Vishtinduk taila, Sarshapadi pralepa, Sudarshan churna, sarvajvarhar lauh[81]
Mucuna prurita Hook	Kapikacchu	Aphrodisiac, dyspnoea, neurological disorder[82]	Vanari gutika, mansabaladi pachana[82]
Murraya koenigii (L.)	Kaidarya	digestive, Diarrhea, diabetes, wound[83]	Leaf powder[83]
Nyctanthes arbortristis L.	Parijata	Arthritis, sciatica, tonsillitis, ring worm[84]	Leaf juice & powder[84]
Ocimum sanctum L.	Tulsi	Fever, Cough & cold, wound, poisoning, urticaria[85]	Tribhuvankirti ras, Muktapanchamrita ras, Muktadi mahanj[85]
Operculina turpethum L.	Trivrit	Constipation, skin disease, oedema, [86]	Avippatikara churna[86]
Oroxylum indicum	Shyonak	Analgesic, antiinflamatory, antipyretic[87]	Dashmoolarishta, [87] Dashmoolkwath
Oxalis corniculata L.	Changeri	anorexia, haemaorrhoids, dysentery, skin disease[88]	Changeri ghrita[88]
Papaver somniferum L.	Ahifena	Intoxicating, Analgesic, colic, insomnia, diarrhea, fever[89]	Ahiphenasav, karpur rasa, nindrodya vati[89]
Phyllanthus amarus Schum.et Thonn.	Bhumyamalki	Liver disorder, jaundice, haemorrhage, [90]	Tejovatyadya ghrita[90]

Plumbago zeylanica L.	Chitrak	Sprue, oedema, indigestion, piles,[91]	Chitrakadi vati, chitrak haritaki,chitakadi churna [91]
Pongamia pinnata Pierre	Karanja	Piles, skin disease, fever, itching, diabetes, cough, Gynecological disorder[92]	Karanjadi taila, Karanjadi ghrita[92]
Premna mucronata Roxb.	Agnimantha	Fever, swellings and body Pain.[93]	Dasmoolarista[93]
Pueraria tuberose DC.	Vidari	weight promoter, Rejuvenator, aphrodisiac, intrinsic haemorrhage, body ache[94]	Marma gutika, Vidarydi kwath, Vidarydi ghrit, Pugakhanda[94]
Punica granatum L.	Dadim	Diarrhea, dyspepsia, fever[95]	Dadimastaka churna, Bhaskar lavan churn,Khadiradi gutika, Marichyadi gutika[95]
Rauwolfia serpentine Benth ex Kurz.	Sarpgandha	Hypertension, insomnia,epilepsy, insomnia[96]	Sarpgandha ghana vati, Sarpgandhadi churna[96]
Ricinus communis L.	Eranda	Inflammation, body ach, arthritis, joints pain, constipation, aphrodisiac, sciatica[97]	Castor oil, Gandharvhastadi tail, Brihat saindhavadi tail, Simhnad guggulu, Chaturbhadra rasa, Cintamani rasa, Chaturmukh rasa[97]
Saccharum munja Roxb.	Shara	Urine disorders, calculus, thirst[98]	Trinpanchmool Kwath, Grahnimihira taila[98]
Sapindus mukorossi Gaer tn.	Arishtak	Burning sensation, headach[99]	Vatari guggulu[99]
Saraca asoca Roxb.	Ashok	Menorrhagia,Uterine tonic, gynecological disorders, [100]	Ashokarishta, Ashok ghrita[100]
Sida cordifolia L.	Bala	Cardiac tonic, nervine tonic, aphrodisiac,[101]	Balaladi kwath, Chandan balalakshadi tail[101]
Sida rhombifolia	Mahabala	Cardiac tonic, neural tonic, aphrodisiac,[102]	Balaladi kwath, Chandan balalakshadi tail[102]
Solanum nigrum L.	Kakmachi	Liver disorder, Piles, heart disease, fever, diabetes, itching, skin disease [103]	Hrdyarnav ras, Mahavishgarbh tail, Rasrajras[103]
Solanum surattense Burm.	Kantkari	Cough, cold, fever, hoarse voice, pain in ribs[104]	Kantkari kwath, Kantkari leha, Vyaghri haritaki, Dashmula kwath, [104]
Solenum torvum Swartz.	Brahati bhed	Cough, fever,[105]	Brihatyadi kwath[105]
Syzygium cumini L.	Jambu	Diabetes, bleeding disorder (Raktapitta), diarrhea,[106]	Pushyanug churna, Ushirasav[106]
Tectona grandis L.	Shak	worms, skin disorder, hypeacidity[107]	Decoction[107]
Tephrosia purpurea Pers.	Sharpunkha	Spleenomegaly, Liver disorder, wound, cough[108]	Sharpunkhamuladi kwath, Punarnavadi kashay[108]
Terminalia arjuna Roxb.	Arjuna	Cardiac tonic, obesity, wound, diabetes, [109]	Parthydyarishta, Arjun ghrita, Nagarjunabhra rasa[109]
Terminalia bellirica Roxb	Vibhitak	Coughing, swelling[110]	Lavangadi vati, Triphala churna[110]
Terminalia chebula Retz	Haritaki	Inflammation, diabetes, piles, Constipation, fever,[111]	Triphala churna, Abhyarishta, Agastya haritaki, danti haritaki, chitrk haritaki[111]
Tinospora cordifolia willd.	Guduchi	Rasayan(rejuvenator), fever, leprosy, arthritis, gout. diabeties[112]	Amritari,shta, Amritaguggul, Amritasatva[112]
Vernonia cineria Less.	Sahdevi	Eruptive boil, wounds, Fever, filaria[113]	Chandrakala rasa, Mahabaladi kwath.[113]
Vitex nigundo L.	Nirgundi	arthritis, gout, backache, cervical lymphadenoma, cough[114]	Nirgundi kalpa, Nirgundi tail[114]
Withania somnifera L.	Ashwagandha	Aphrodisiac, sedative, nervine tonic, tonic, rejuvenator[115]	Ashwagandha leha Ashwgandharishta[115]
Woodfordia fruticosa Kurz.	Dhataki	Diarrhea, wound, bleeding disorders, erysipelas [116]	Braht gangadhar churna[116]
Wrightia tomentosa Roem.&Sceult	Stri kutaja	Jaundice, tooth ache, fever[117]	Leaf juice[117]
Zanthoxylum armatum DC.	Tejovati	Fever, Cough & cold, piles, beneficial for teeth and throat[118]	Saptavimshati gugglu, Mahavishgarbhadi tail, Hingvadi tail.[118]

CONCLUSION

Ayurveda is the science of life which not just deals with cure of some diseases but has become a complete way of life. This ancient system of health care is relevant or effective to people of today, when technological progression have drastically altered our lifestyles, our environment as well as our medicine. Uttarakhanda one of the pioneer Himalayan states is a rich repository of medicinal plants. Dehradun district of Uttarakhanda is richly endowed with a large variety of plant species; many of them have medicinal properties. A large number of rural populations depend on locally available medicinal plants to get their healthcare requirements. Thus availability of these threatened and high values medicinal plants in the area indicate that if such biodiversity area are closed to any type of anthropogenic activity, the status of these threatened plants can be improved and conserved for future prospects. Therefore such protective area could be as future genetic repository for various medicinal and threatened plant species. Considering the importance of digital information of different geographical regions and lack of detailed information regarding plant diversity of Lacchiwala region, we initiated the task of *In silico* documentation of medicinal plants in Lacchiwala range, Dehradun forest division, Uttarakhand (India).

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