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Traditional Uses of Medicinal Plants by Indigenous Tribes of Ladakh Union Territory

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A B S T R A C T

Ladakh Union Territory constitutes the major portion of the Indian cold desert. It has a vast diversity of medicinal and aromatic plants. Traditional uses of medicinal plants to cure various ailments in Ladakh have been practiced from time immemorial. The current investigation was conducted to substantiate the information on traditional uses of medicinal plants in the region and to keep the existence of this system in the future. Extensive field survey was conducted in different region of Ladakh UT from April 2016- September 2021 to observe the habitat, distribution pattern, altitudinal ranges, flowering, and traditional uses of aromatic and medicinal plants. The elevation and geo-coordinates were recorded from Garmin GPS *Erex-30.* A total of 500 informants were interviewed during the current study. All the informants belonged to two religions i.e., Islam and Buddhism. Male informants are composed of (55%) and female 45 %. A total of 169 plant species (3 gymnosperms, 166 angiosperms) belonging to 41 families and 108 genera have been recorded, were used by local peoples of Ladakh such as Amchis, Abas, Shepherds, Dards, Brokpas, Baltis, Purkies and Herbalists. Most of the medicinal plants utilized by indigenous peoples belonged to the family Asteraceae followed by Lamiaceae, Ranunculaceae and Apiaceae. The most plant part used were Leaves (24%) followed by flowers (20%), roots (16%), seeds (11%), and whole plant (10%). The major inhabitants of Ladakh live at an elevation of 2800- 3800m asl. From the current study, it can be inferences that tribal people of Ladakh particularly older people possess a vast knowledge of traditional system medicine locally known as “Amchi’s” or “Tibetian” system of medicine. Thus, the documentation of this current traditional system of medicine will add to its conservation and will dispense new drugs for the betterment of society. There is an immediate need to conduct awareness programs by involving various stakeholders, universities, colleges, schools, and other various government and non-governmental organizations and to adopt sustainable utilization strategies.

***Key words*:** Ladakh, Ethnomedicinal plants, Traditional uses, Habitat, Elevation

Ladakh is a newly formed Union Territory on 5th August 2019, separated from the state of Jammu & Kashmir. It consists of two districts viz. Leh and Kargil which covers an area of more than 78,000 Km^2 which lies between 32°15`50 – 35°38`11 N latitudes and 75°36`73 - 78° 31`11 E longitudes at an elevation of 2700-7560m. The highest peak is Saser Kangri 7,680 m. [1-2]. A large proportion of the population lives at an elevation of 3300- 4500m. It is also known as ‘‘Land of passes’’, ‘‘Land of Lamas’’, ‘Little Tibet’ [3-4] and has been considered as the cold desert of India [5]. The Indian cold desert is mainly confined to Ladakh UT and Lahul- Spiti district of Himachal Pradesh. Physiographically Ladakh is mainly divided into six valleys i.e., Leh, Nubra, Changthang, Zanskar, Suru, and Drass [6]. The earliest records of the flora of Ladakh and western Tibet have been compiled by Stewart in 1916-17 (831 species in 66 families). Later, a total of 611 plant species from Ladakh (540 are dicotyledons, 65 monocotyledons, and 2 gymnosperms). According to the latest floristic, more than 1180 vascular plant taxa have been reported from the cold desert of Ladakh [7]. Generally, the vegetation of Ladakh comes under sub-alpine, alpine, and high alpine zones and is dominated by annual and perennial herbs, followed by a few stunted shrubs and bushes; which differ remarkably from the rest of the Himalayas due to existing unique, topographic, physiographic and climatic conditions. The climate of Ladakh is predominantly aridly characterized by low annual precipitation (50-300 mm), and cold due to high elevation and glacier-capped mountains. The annual average temperature of Ladakh is less than 10°C. The temperature may exceed at a lower elevation in summer. There are great diurnal variations in daily atmospheric temperature during the summer season ranging from 0°C to 35°C. In Ladakh, 80% of older peoples from the age of above 35 years still depends on the traditional system of medicine.

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Whenever they got sick, they followed traditional system of medicine. In Leh the traditional system of herbal medicine is called 'Sowa Rigpa' and the medical practioner is called Amchi in Leh and Aaba in Kargil district. With the advancement of allopathic medicine and discovery of new medical technology, the use of traditional herbal treatment system is diminishing fastly in Ladakh. The transfer of information from older to younger generation is very low <2%. This paper is documented with the objective to keep the existence of this system in future by adopting sustainable strategy. Ethnobotanically Ladakh is explored by various workers [8-10]. But still there is lot of provision to explore the Ethno botanical studies in Ladakh as it has vast cultural, religious and tribal diversity. The plant species have various vernicular names in Ladakh. In these studies, we used those vernicular names which are very familiar with most of the population (>80%).

MATERIALS AND METHODS

Extensive field survey was conducted in whole Ladakh vis. Leh, khardongla, Nubra, Khalsi, Indus valley, Chiktan valley, Shargole, Drass, Kargil, Sankoo, Barsoo, Suru, Rangdum and Zanskar valley from April 2016- September 2021. Ladakh is located between 32°15`50 - 35°38`11 N latitudes and 75°36`73 - 78° 31`11 E longitudes at an elevation of 2700- 7560m. The Altitudes, latitudes and longitudes were measured with the help of GPS Garmin Etrex-30.

Ethnographic background of local tribes

Ladakh has vast diversity of Language, culture and religion. The dominant religion in Ladakh is Buddism and Islam. In Leh District Buddism is the dominant religion whereas in Kargil Islam is the dominant religion. The most Spoken language in Ladakh is Ladakhi and Purki, apart from these other languages spoken in Ladakh are Shina, Brokpa, Balti, etc.

Data collection

Data on traditional uses of medicinal plants in Ladakh was gathered from the informants living in different regions of Ladakh from April 2016- September 2021. A total of 500 informants were interviewed (300 males and 200 females). The informants belonged to both Muslim and Buddhist religions. The information was obtained through questionnaires in local languages as the authors are natives of the study area. Interviewed were conducted in local language from more than 500 informants of different age groups. Short semi-technical questions were framed such as-local name of the plant, part used, wild or cultivated, collection time, mode of collection used to cure only human-related diseases, mode of usage, formulation-decoction, paste, extract, dosage etc. Field surveys were conducted at different times in order to gain maximum information regarding to habitat, distribution, phonological events and flowering. To gain the traditional knowledge among various age groups, the informants were categorized into six age classes, i.e., 15-24 years (Young generation), 25-34 (New generation), 35-44 (Adult), 45-54 (middle-aged), 55-64 (old aged), above 65years (veterans). Besides this, the informants were also categorized on the basis of educational qualifications. i.e., Never attended school, attended school for 1st - 5th classes, attended school for 6th - 10th classes, intermediate (12th) and graduate (Table 1).

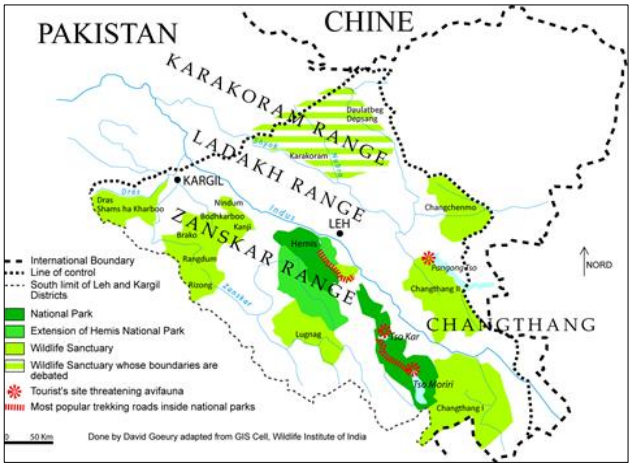

Fig 1 Study area- map of Ladakh; courtesy by David Goeury GIS cell, wildlife institute of India

Table 1 Demographic description and literacy of informants

S. No	Age group	No. of informants	Males	Females
1	15-24 (Younger generation)	92	64	28
2	25-34 (New generation)	118	58	60
3	35-44 (Adult)	98	42	56
4	45-54 (Middle aged)	102	58	44
5	55-64 (Old aged)	60	35	25
6	65 (Above veterans)	30	18	12

Educational qualification of informants	Age groups					
	15-24	25-34	35-44	45-54	55-64	65 above
Never attended school	0	0	3 (1 male, 2 female)	17 (5 male, 12 female)	18 (6 male, 12 female)	15 (7male, 8 female)
Attended school for 1st - 5th classes	92 (All)	118 (All)	70 (35 male, 35 female)	85 (47 male, 38 female)	42 (29 male, 13 female)	15 (9male, 6 female)
Attended school for 6th -10th classes	92 (All)	98(52 male, 46 female)	63 (31 male, 32 female)	66(35 male, 31 female)	18(13 male, 5 female)	5 (5 males, 0 female)
Intermediate (12th)	80 (50 male, 30 female)	92(49 male, 43 female)	43 (27 male, 16 female)	21 (14 male, 7 female)	7 (5 male, 2 female)	0
Graduate	30 (13 male, 17 female)	54 (31 male, 23 female)	27 (13 male 14, female)	9 (7 male, 2 female)	0	0

Field studies for determination of habitat, life-forms

Extensive field survey was conducted during different seasons. More than 100 villages were covered in the current study. Field visits were conducted along with the local expert peoples, shepherds, Amchis, Aabas to identify the plants correctly, field data on habit, habitat, geo-coordinates, flowering and fruiting were recorded on the spot. Videos, photographs, of the specimens, were also taken.

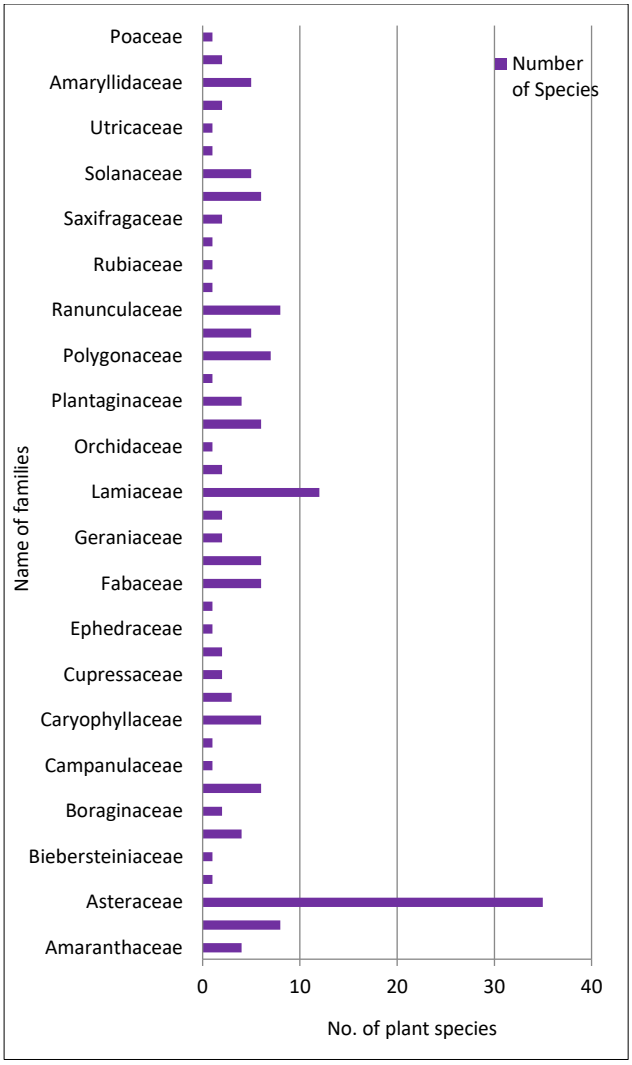

Fig 2 Representation of the families and number of plant species studied at study site

Literature review

The scientific literature on ethnomedicinal studies conducted in Ladakh UT of India was surveyed from the sources such as SciFinder, sci-hub, Scopus, CAB international, DOAJ, Google Scholar, PubMed, Science-Direct and Web of Science.

Statistical analysis

The collected data were analysed using Microsoft Excel office10. Percentage and frequency graphs were generated to summarise and clear depiction of results and discussion.

RESULTS AND DISCUSSION

Informants

The informants were mainly local inhabitants of Ladakh. A total of 500 informants were interviewed during the study. All the informants belonged to Islam and Buddism. Male informants are composed of (55%) and female 45%. The female informants were educationally poor prior to male informants. The demographic data of informants were depicted in (Table 1).

Floristic attributes of medicinal plants

In the study area, a total of 169 species (3 gymnosperms, 166 angiosperms) belonging to 41 families and 108 genera were used by local inhabitants of Ladakh (Table 2). Herbarium specimen was collected and deposited to Kashmir University herbarium (KASH) under a specific voucher number. The most used families were Asteraceae (18 genera and 35 species) followed by Lamiaceae (6 genera and 12 species), Ranunculaceae (6 genera 8 species), Apiaceae (8 genera and 8 species), Polygonaceae (5 genera 7 species), Brassicaceae, (4 genera 6 species), and Caryophyllaceae (3 genera 6 and species). 13 families were represented by only single species (Fig 2). The medicinal plants mostly used by indigenous tribes of Ladakh were herbs (81%) followed by shrubs (15%) (Fig 4). Plant parts mostly used were leaves (24%) followed by flowers (20%), root (16%), seeds (11%), and whole plant (10%) (Fig 3). The percentage contribution of plant parts collected through destructive methods (whole plant, root, bulb, rhizome and seed) was 37% (Fig 5). Plant mostly found at lower elevation in Ladakh were *Achillea millefolium, Aconitum heterophyllum, Carum carvi, Hippophae tibetana, Hyoscyamus niger, Myricaria elegans, Physochlaina praealta, Prangos pabularia , Thlaspi arvense, Verbascum Thapsus* etc., whereas plant grown at high altitude were *Allium przewalskianum, Arnebia euchroma, Bergenia stracheyi, Corydalis flabellate, Corydalis govaniana, Picrorhiza kurrooa, Rhodiola heterodonta, Rhodiola imbricate, Saussurea gnaphalodes, Saxifraga flagellaris, Swertia petiolata, Waldheimia tomentosa* etc.

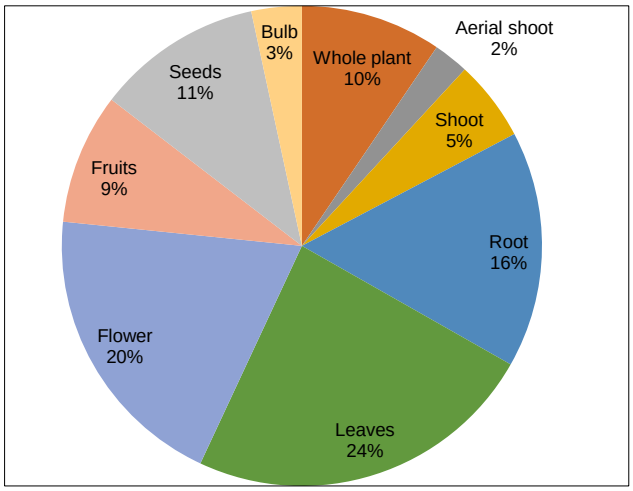

Fig 3 Percentage contribution of plant part used by indigenous tribes of Ladakh

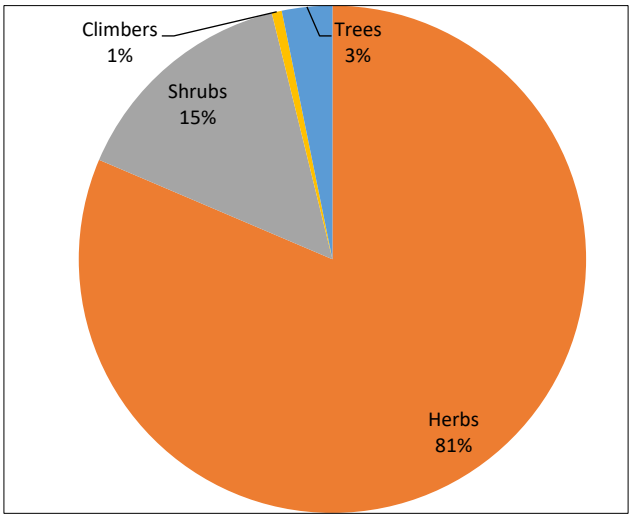

Fig 4 Percentage contribution of various growth forms of medicinal plants at study site

Disease prevalence in Ladakh

The most prevalent diseases in the Ladakh region were upper respiratory diseases such as cold and cough, stomach and acid reflux diseases, headache, gastrointestinal disorders,

asthma, infertility, women's pregnancy-related diseases. According to informants, frequent climate changes may often cause respiratory and stomach-related diseases. Acidity is the most common disease in Ladakh caused by taking less water and liquid as the environment is very dry and cold. Headache (mostly migrain) is also a common disease of Ladakh. Most of the plant species have common usage in every ethnic group of people in a different area of Ladakh. Therefore, in the current study, I found similar results as former ethnobotanical workers such as [11-14].

Table 2 Medicinal plants used by indigenous tribes of Ladakh UT to cure various human-related diseases

Scientific name	Family	Local name	Life form	Altitude (meter) asl	Flowering	Flower color	Habitat	Part used	Medicinal uses/ diseases treated	Ref.
Acantholimon lycopodioides (Girard.) Boiss.	Plumbaginaceae	Longzay	Perennial Sub-shrubs	3400- 4650	Mid-June-July	White to pink	Dry stable hill slopes and on rocks	Leaves, flowers	Heart problems.	[8,9,18,19]
Achillea millefolium L	Asteraceae	Chaung	Perennial herb	3100-3700	July- August	White	Dry places, along roadsides	Leaves, flower	Cough, anti-inflammatory, stomach troubles, astringent, urinary problems, kidney disorders, urinary tract infection, dysuria, wounds, toothache, gum problem, diaphoretic	[8,9,15,19, 20,21]
Aconitum heterophyllum Wall. ex Royle	Ranunculaceae	Karpo-Bova/ Bona-Karpo	Biennial or perennial herb	3100- 3600	Mid-June - July	Light greenish with purple stripes	Moist damp soil, semi-shaded places, under the shade of Salix specie, near, irrigated lands.	Rhizome	Toothache, gastric problems, leprosy, arthritis, antiperiodic, headache, intestinal complaint, paralysis, fever, antidiabetic, vomiting, diarrhea.	[6,8,9,19,21,22, 23]
Aconitum violaceum Jacq.ex Stapf	Ranunculaceae	Nagpo Bova/ Boma-nagpo	Biennial or perennial herb	2800-3700	Mid-June-August	Dark blue to violet-variegated	Montane, subalpine grasslands, strictly distributed along the bank of irrigation canals.	Rhizome	Cough, asthma, dyspepsia, high fever, lung problem, rheumatism	[8, 9, 19, 16, 6, 23]
Aconogonon tortuosum (D.Don)Hara	Polygonaceae	sNyalo	Perennial herbs	3700-4500	Mid-June-July	Creamy white	Sandy, loamy, gravel mountain slopes, or screes	Leaves, flowers	Blood purifier, urinary tract infection.	[9, 20, 15]
Allium carolinianum DC	Amaryllidaceae	Koshok	Perennial herb	3600- 4400	Late June-August	Pale red to light pinkish	Dry loamy slopes, plains, rock crevices, scrub	Aerial part, Bulb	Headache, constipation, indigestion, joint pains, diarrhea, fever.	[16, 9,, 19, 24]
Allium humile Kunth	Amaryllidaceae	Neikchey	Perennial herb	3000- 3800	July- August	white	Sandy, loamy stable slopes, plains mostly between rock crevices	Bulb, leaves	Stomach complaint, indigestion. Leaves are used as a substitute of *Allium cepa* in flouring vegetables.	[19, 17, 25]
Allium przewalskianum Regel	Amaryllidaceae	Koshok / Kangmar	Perennial herb	3600-4300	Mid-June – July	Pinkish to pale red	Dry loamy slopes, plains, rock crevices, scrub	Bulb, Leaves	Stomach problems, dysentery. Leaves were used as a substitute for *Allium cepa* in flouring vegetables, prickles.	[8, 9, 21, 25, 2]
Allium stoliczkai Regel	Amaryllidaceae	Skotse	Perennial herb	3200-3700	July- August	White-pinkish	Dry loamy or sandy slopes	Bulb, shoot	Constipation, energy booster.	[26]
Allium walliehii Kunth	Amaryllidaceae	Skotse	Perennial herb	2600-3100	July -August	Pink	Loamy stable slopes	Bulb, Leaves	Stomach troubles	[18]
Amaranthus spinosus L.	Amaranthaceae	Chulai	Perennial herb	2700-3200	July –August	Light green	Grows in oasitic habitat along moist cultivated field margins,	Leaves	Antispasmodic promotes menstruation, facilitates kidney function.	[20, 15, 25]
Anaphalis cuneifolia (DC.) Hook. f.	Asteraceae	Simula	Perennial herb	3450- 4490	Mid-July – August	White	Alpine mesic stable slopes	Leaves	Leaf extract is applied for skin problems.	[8]
Anaphalis triplinervis (Sims) Sims ex C.B.Clarke	Asteraceae	Spra-rgo/ Yaktso		3800- 4600	July - August	Ray flower white, disc flower- light yellow	Dry stable steeps,	Whole aerial parts	Epidemic fever, chronic disease, antidote against wounds, cuts, skin disease, genital problems. Flower buds are eaten as salad after the meal.	[22, 9, 19, 27]
Androsace aizoon Duby	Primulaceae	Zatikmukpo	Perennial herbs	4000-5000	Mid-July-August	White to light pink	Alpine meadows, rock cervices fed by streams	Whole plant	Cough, indigestion	[9]
*Androsace mucronifo*lia Watt.	Primulaceae	Zigsolo	Perennial herbs	4000-5020	Mid-July-August	White to pink	Alpine meadows, screes, rocky slopes with stream-fed beds	Whole plant	Abdominal pains	[19]
Androsace rotundifolia Hardw	Primulaceae	Zigsolo marpo	Perennial herbs	4000-5020	Mid-July-August	White to pink	Alpine meadows, screes, rocky slopes with stream-fed beds	Whole plant	Tonic, stomachache	[9, 19]
Anemone rivularis Buch.-Ham. ex DC.	Ranunculaceae	Zukpa / Srub-ka	Perennial herbs	3800- 4440	July- August	White	Alpine gravelly mesic slopes, cliffs,	Whole plant/ fruit	Gastritis appetizer, indigestion. Whole plant extract is used against flu, dry cough and fever. Fresh leaf extract is used to stop bleeding from cuts and healing of wounds.	[19, 21, 9]
Aquilegia fragrans Benth.	Ranunculaceae	Shaospotra	Perennial herbs	3000- 4200	Mid-July-Ending August	White- light purple	Steep slopes, screes, rock cervices near streams or snow-fed rivers	Aerial part	Headache. The aerial part of the plant is sun-dried and ground into powder. ½ teaspoon powdered is taken along with honey to cure diabetes, and knee pains.	[19]
Arabidopsis himalaica (Edgew.) O.E.Schulz	Brassicaceae	Sbiu-lapug	Biennial herb	2600-4000	June- July	purplish-pink	dry rocky slopes, screes,	Whole plant	Indigestion, appetizer	[9]
Arabidopsis wallichii Hook. (F & J) M. Bush	Brassicaceae	Pasaka	Biennial herb	2600- 3700	June- July	Yellowish-white	dry rocky slopes, screes, rock cervices	Aerial part	Measles, sore throat, appetizer.	[18, 19, 8]
Arabis tibetica Hook.f. & Th.	Brassicaceae	------	Biennial herb	3200-3700	June-July	White	Rock cervices, stony area	leaf	Wounds & cuts	[19]
Arctium lappa Kalm.	Asteraceae	Jisung/ Byibzyung	Biennial herb	2700-3300	July- August	Ray floret pink, disc floret yellow	Moist, oasitic places, ditches, bank of cultivated fields	Whole plant	Stomachache, urinary bladder cysts, uterus tumors, nerve disorders, kidney disorders, dissolve kidney stone, astringent, blisters, ulcers diuretic, uterus tumor, anti-cancers	[16, 9, , 20, 19]
Arenaria bryophylla Fern.	Caryophyllaceae	Oma-strwa	Perennial herbs	3600- 4200	July- August	Bright White	Stony slopes, alpine meadows, snow-fed pastures, gravel sands near rivers.	Whole plant	Relieved kidney pains, burning sensation of the urinary tract. Aerial shoot extract is given to ladies to cure menstrual irregularities.	[19, 20, 9]
Arenaria griffithii Boiss	Caryophyllaceae	Oma-strwa	Perennial herbs	3400- 4000	July -August	White	Sandy slopes, stony sandy places	Stem, leaves	Menstrual problems, release bile juice.	[9, 19]
Arenaria serpyllifolia Linn.	Caryophyllaceae	Rtswa-a-krong	Perennial herbs	3300-3800	July- August	White	Disturbed mesic places, field margins, along roads, abandoned fields.	Whole plants	Facilitates kidney function	[20]
Arnebia euchroma (Royle) I.M.Johnst	Boraginaceae	Sgrons/ sbrons/ Demok	Perennial herbs	3600- 4800	Mid May-August	Blackish to deep Purple	Stabilized slopes, screes, gravel or sandy slopes	Root, leaves	Lung's problems, pulmonary diseases, blood disorder, blood purification, nose bleeding, cough, burns, backache, kidney infections, urinary disorders, anti-inflammatory, menstrual cramp, hair tonic.	[9, 28, 29 8, 6, 15, 2]
Arnebia guttata Bunge	Boraginaceae	Dremok	Biennial or Perennial herbs	3400- 4500	Mid-June – Ending August	Yellow	Sandy slopes.	Root, leaves	Hair tonic, cough, blood purifier. Root paste is applied to recover cuts and wounds.	[9]
Artemisia absinthium L	Asteraceae	Burtse-kar/ Bursey	Perennial herb	3000- 3700	Mid-July to Late August	Yellow	Moist humid soils, sandy rocky terrain near water	Whole plant	Rheumatism, malaria, intestinal worms, amenorrhea, menstrual problems. Fresh leaves are sun-dried and crushed and made powder and boil with water to cure fever and diabetes.	[9, 15]
Artemisia brevifolia Wall. ex DC	Asteraceae	Khampa	Perennial subshrubs	2700-3500	Mid-July Late August	Flower head yellow	Steeps on stabilized slopes, rocky cervices,	Leaves, inflorescence	Intestinal worms, gastric problems, aphrodisiac, antiseptic, laxative and blood purifier, obesity, reduced stomach fat deposition, fever.	[18, 18, 22, 9, 6]
Artemisia dracunculus L.	Asteraceae	Tsar-bong	Perennial shrubs	3200-3990	August-September	Pale Yellow	Disturbed lands, gravel slopes, abandoned fields	Aerial part	Stomach problems, menstrual disorders, toothache, diuertic, antihelminths.	[22, 8, 15, 18, 20, 19]

Artemisia gmelinii Web.ex Steckm.	Asteraceae	Burtse / Khampa shridi	Perennial shurbs	3400-3700	Mid July-September	Yellow	Dry stony slopes, steeps, rock cervices	flower	Cold, cough	[19, 6, 16,]
Artemisia macrocephala Jacq.ex Bess.	Asteraceae		Annual or biennial herb	3200-3600	July- August	Dull Yellow	Disturbed habitats on road margins, ditches, river pastures, gravel river deposits.	leaf	Joint pains	[19]
Artemisia maritima L. ex Hook.f	Asteraceae	Burtse / Bursey	Perennial shrubs	3200- 9850	August-September	Yellow	Dry stable sandy slopes, on rock cervices, steeps	Leaves, seeds	Skin diseases, fever, aphrodisiac stomachache and rheumatism, Decoction of leaf extract kills intestinal parasites particularly roundworms.	[9, 19, 16]
Artemisia moorcroftiana Wall. ex DC.	Asteraceae	Bursey	Perennial subshrubs	3400-3750	August-September	Pale yellow	River bed sediments, ditches, roads margins, between rick cervices, disturbed habitats, field margins.	Leaves, flower, seed	Leaf and seed are boiled with water and given to the patient suffering from malaria.	[9]
Artemisia parviflora Roxb.	Asteraceae	khamang	Perennial subshrubs	3200-3400	August-September	Light yellow or white	Abandoned fields, moist ditches,	Whole plant	Throat infection, relieve painful urine, diuretic,	[19, 15, 20, 23]
Artemisia salsoloides Willd.	Asteraceae	Hotongs / Amango	Perennial subshrubs	3400-3870	August-September	Light yellow or white	Stony stabilized slopes, dry stony beds.	Leaves, seed	Intestinal complaint.	[19]
Artemisia sieversiana Ehrh. ex Willd.	Asteraceae	Khamchu/ khampa	Perennial herb	2800-3600	July-September	Dull yellow or greenish	Cultivated field margins, along roads, dry disturbed places	Leaves	Controls kidney inflammation, bronchitis, jaundice, kidney trouble, nerve tonic, promotes urination, indigestion. Leaf extract is used to kill intestinal worms.	[20, 19, 18]
Aster flaccidus Bunge	Asteraceae	Lukmik / Brang-rgaz	Perennial herb	3850-4530	August-September	Ray floret blue, disc floret orange to yellow	Wet alpine grasslands and pastures.	Fruit and seed	Eye problems, liver disease, fever, bronchitis, cramps and cough. Flower were collected early morning and sun dried then it is boiled with water and given patient suffering from cough,	[9, 19, 6, 2]
Astragalus munroi Benth. ex Bunge	Fabaceae	Kharkhati-srawa	Perennial herb	2600- 3800	July-August	yellow	Unstable screes, abandoned dry places	Root	Skin diseases, cough	[19]
Astragalus rhizanthus Royle ex Benth.	Fabaceae	Skralachunk/ Sarma / srad-ser	Perennial herb/ subshrub	2700- 3600	July- August	Bright yellow	Ditches, stony moist slopes, along road sides near to locality, disturbed places near cultivated fields, subalpine meadows	Leaves, stem, flower and fruit	Nerve tonic, wounds, skin diseases bleeding, high altitude sickness and weakness.	[28, 9, 28, 18, 19]
Astragalus zanskarensis Bunge	Fabaceae	Chisigma / Zanskari Skrala-chunk	Perennial subshrub	3000- 3800	July- August	Bright yellow	Abondoned lands, stopny slopes, sandy dry soil	Root	Intestinal worms	[9, 26]
Berberis brandisiana Ahrendt.	Berberidaceae	Skerpa / Khardung / Drakpose	Perennial shrub	3600- 3800	July- August	Yellowish	Moist, alpine slopes.	Root and bulb	Eye problems, tonic	[9]
Berberis lyceum Royle.	Berberidaceae	Daruhaldi	Perennial Shrub	2500- 3200	May-June	Yellow	Semidesert stabilized slopes. Abandoned fields.	Root, Leaves, Fruit	Cold, cough, jaundice, chronic diarrhea, gonorrhea, remedy for swollen and sore eyes, broken bones, wounds, ulcers and acute conjunctive. Used as a bitter tonic astringent. An ointment made from root powder is mixed with mustard or olive oil and applied to broken bones.	[6, 27]
Berberis ulcina Hk. f. & Th.	Berberidaceae	Shinnar / chhelpa/ Khizer / Kirsing	Perennial Shrub	3,100-3400	June-August	Orange-Yellow	Open abandoned slopes, semidesert	Root, bark, Fruit	Arthritis cough, fever, ringworm infections, piles diarrhea.	[8, 27]
Bergenia stracheyi (Hook.f. & Thomson) Eng.	Saxifragaceae	Gatikpa/ Shapur	Perennial herb	3600- 4200	June-August	Pinkish- white	Moist rocky slopes, recks cervices faded with mountain springs. Damp stony screes	Roots, leaves, flower	Diuretic, urinary disorders, cuts & wounds, blisters, stomachache, kidney stones. 1 cup of leaf and flower decoction twice a day is helpful for indigestion and fever. Roots paste is applied for body pains.	[20, 15, 29, 19, 16,29]
Betula jacquemontii (Spach) H.J.P. Winkl.	Betulaceae	Towa / Strak	Perennial Tree	3400- 3900	-	White or brownish bark	Moist slopes, most rock cervices fed by snow or stram water, upper limit of treeline	Root, bulb, Bark	Asthma, Jaundice, burns, leprosy, wounds, bronchitis. Bark has antiseptic properties and is applied on wounds and cuts.	[16, 9, 19]
Biebersteinia odora Steph. ex Fischer	Biebersteiniaceae	Khardung /Dakpose	Perennial herb	3700-4700	July- August	Deep yellow	Stony places, steeps	Leaves	Septic wounds, kidney disorders, blood purification, peptic ulcer, diarrhea, urinogenital disorders	[8, 18, 19, 9]
Bistorta vivipara (L.) Gray	Polygonaceae	Mikchay / Langna	Perennial herb	2700-3300	July- August	Bright white	Moist, humid places, bank of turf irrigation canals, under the shade of trees	Root, Flower and seed	Root and seed are boiled with milk and taken orally to cure back problems, abdominal pain	
Bunium persicum (Boiss.) B.Fedtsch	Apiaceae	Nagpo-zera		2800- 3500	July-August	Bright white	It's mainly cultivated in gravel soil.	Seed	Abdominal pain, colic pain, dysentery, indigestion, cold, cough, fever, appetite, liver problems, back pain	[8, 9, 19, 25, 21]
Bupleurum longicaule Wall. ex DC	Apiaceae	Sah-kukchak	Perennial herbs	3400-4100	July- August	Dark blue	Stabilized slopes, alpine meadows, alpine moist steeps	Flower	Stomachache, antidote, gastric problem, tonic	
Capparis spinosa L	Capparidaceae	Capra/ Kabra	Perennial Shrubs	3100-3750	July-September	White to purple	Dry stabilized screes, semi-deserts, disturbed dry road banks,	Fresh Leaves, Root, buds	Hepatitis, liver disorder, acidity, toothache, paralysis, gout, tonic, old age ailments, fever, hyperacidity, stomach trouble, pain reliever, diuretic, paralysis, arteriosclerosis, kidney, disinfectants	[2, 9, 26, 23]
Capsella bursa-pastoris (L.) Medik	Brassicaceae	Medikus / Shamso / Sog-ka/ Makhaa	Perennial Shrubs	3200-3800	July-August	White	Weed in fields, waste places in villages, gardens, old demolished houses, mesic soil of house vicinity	Leaves	Leaves were used as vegetables, immune booster, fever, anti- vomit, stomach, hemorrhages, kidney hemorrhage, uterus disinfectant, diuretic	[22, 18, 20, 15, 19, 18]
Caragana versicolor Benth	Fabaceae	Trama/ Tsaan	Perennial Shrubs	3000-3540	July- August	Yellow	Dry slopes, dry watersheds	Seed	Blood purifier, antiseptic, throat infection, food poisoning, Dysmenorrhoea, fever	[26, 9, 19]
Carum carvi L	Apiaceae	Kosnyot / kumbulik	Biennial herb	2700-3600	Mid-July - September	White	Moist, damp soil, under the shade of trees, semi-shaded area, bank of irrigation canals, open meadows, abandoned places, disturbed wetlands, ditches, turf soil	Whole Plant	Indigestion, throat infection, nose problems, febrifuge, promotes menstruation, urination. Eye problems. The whole aerial part is used as vegetables in the spring season. Seeds are called Ladakhi zeera; especially used as a flavoring agent	[30, 21, 18, 22, 16, 24, 26, 19, 8, 15]
Cerastium cerastoides (L.) Britton	Caryophyllaceae	Spang-yan-karpo	Perennial herbs	3500-4300	Mid-July-August	White	Alpine springs, moist alpine screes, alpine wet rocks	Aerial part	Renal colic, Headache, body-ache	[9]
Chaerophyllum reflexum Lindl.	Apiaceae	Lcha-wa or Young/ Neuchay-puth	Biennial herbs	3200-3500	Mid-July-August	White	Moist, wetlands in villages, semi shaded slopes in an abandoned field, damp soil in ditches.	Roots	Promotes urination, Relieves painful urine.	[20, 20]
Chenopodium album L.	Amaranthaceae	Snue/ Janchikarpo	Annual/ biennial herbs	3200-3900	Mid-June - August	Light Green	Cultivated fields, wet ditches, animal resting meadows	Leaves, flowers, seeds	Stomach complaint.	[19, 26, 20]
Chenopodium botrys L	Amaranthaceae	Snue/ Sagni	Annual/ biennial herbs	3350-4000	Mid-June - August	Greenish	Weed in sandy barley, wheat fields, sandy river sediments, disturbed habitats, along roads; sandy steppe, dry gravel river beds,	Leaves, Flower	stomache, indigestion, anthelmintic, laxative	[9, 19]
Chenopodium glaucum L	Amaranthaceae	Sanak	Annual/ biennial herbs	2700-3400	Mid-June - August	Greenish white	Weed on arable land, disturbed marshes	Leaves	Purgative	[9]
Chrysanthemum pyrethroides (Kar. & Kir) B. Fed.	Asteraceae	Serpan	Biennial or perennial herb	3400 5150	July-August	Ray floret white, disc floret yellow	Subalpine and alpine screes, steeps, bank of alpine stream, rivers.	flower	Septic wounds, fever, arthritis,	[19, 6]
Cicer microphyllum Benth	Fabaceae	Sari/ Sari gangbo	Perennial herb	3400-3800	June- July	Blue-purple	Stabilized dry to mesic slopes, unstable gravel and stony slopes	Leaves, fruit, seed	Jaundice, sore throat, ripened fresh seeds were directly eaten by local peoples.	[9, 19]

Cirsium arvense (L.) Scop	Asteraceae	Sbancher/Biangtser	Perennial herb	3400-4200	Mid-June-August	Ray floret Pinkish-red	Disturbed sandy river sediments, sandy abandoned field.	Leaves	Anti-vomit, headache, healing wounds.	[9, 18]
Clematis orientalis L	Ranunculaceae	Emong	Perennial Shrub	2700-3400	July- August	Yellow	Hard stony mesic places under the shade of trees.	Aerial Shoot	Gastric trouble, dysentery and indigestion.	[21, 9]
Clematis tibetana Kuntze	Ranunculaceae	Emong nagpo	Perennial climber	2700-3400	Mid-July-September	Dark- purple	Moist grassland in villages, gravel river banks	Root, leaves, seed	Indigestion, scabies, Itching, anti-syphilitic,	[9, 21, 19, 18]
Codonopsis ovata Benth	Campanulaceae	Fak-fak/ Mokhting/ ladut	Perennial herbs	3300-4100	July-August	Creamy-blue	Moist stabilized places in villages, bank of alpine and subalpine streams, and the edge of cultivated fields.	Aerial part and Root	Blood purifier, arthritis, lung trouble, skin disease, elephantiasis, gout, stomach ulcer, liver problems, chest conjunction, nerves disorder, rheumatism. Roots are directly consumed in the wild. Root pastes are applied on cuts and wound to clot bleeding and healing.	[9, 22, 19, 18]
Colchicum luteum Baker	Liliaceae	Tukapa/ Kapi-cherik	Biennial or perennial herb	3300-3800	May-June	Yellow	Open snow cleared stabilized and unstabilized gravel slopes.	Root	Colchicine, gout	[9, 29]
Corydalis flabellata Edgew.	Papaveraceae	Makshang	Perennial herb	4000- 5000	July-August	Yellow	Semidesert, dry stony places, snow cleared rocky area.	Aerial shoot	Syphills, scorphula	[18, 18]
Corydalis govaniana Wall	Papaveraceae	Maqshang/ Stongzil/ cha-rKang	Perennial herb	3880-4500	July-August	yellow	Alpine meadows, bank of alpine springs,	Aerial shoot, leaves, flower, fruit, seed	Blood purification, liver disorders, fever, lung trouble, gall bladder problem, febrifuge, gastric, antipyretic, diuretic, muscular pain.	[28,29, 19, 6, 9]
Corydalis meifolia Wall	Papaveraceae	Maqshang/Tongrusilva	Perennial herbs	3950-4800	July-August	yellow	Alpine meadows, bank of alpine springs, screes,	Whole plant	Fever, stomache	[9, 19]
Cousinia thomsonii C.B.Clarke	Asteraceae	Oma-khoul/ sbiangtser/ Biangtser nakpo	Perennial herbs	3600- 3800	Mid-June-August	Pink to purple	Semidesert, alpine alluvial gravel soil	Root, leaves, flower	Arthritis, sprain, whole body pains.	[9, 19]
Cremanthodium ellisii (Hk. f.) Kitam.	Asteraceae	-----	Perennial herbs	4370- 4800	July-August	Ray floret yellow, disc floret dull yellow	Gravel moist slopes, snow beds, close to alpine streams and springs	Leaf, flower	Fever, antiseptic, diphtheria, cold, antidote against poison.	[19, 18, 22]
Dactylorhiza hatagirea (D.Don) Soo	Orchidaceae	Angulakpa/ Wangbolakpa	Perennial herbs	3200- 3800	June-July	Pinkish-purplish white	Wet muddy damp hard soil, wet alpine meadows, Edges of streams and springs.	Root-tuber, leaves	Kidney disorders, fever, sedative, dysuria, health tonic, aphrodisiac, diarrhea, cuts, roundworms, increases,	[8, 9, 6, 2, 16, 20, 22, 15, 16, 21, 18, 29]
Datura stramonium L	Solanaceae	Datura	Perennial subshrubs	2700-3300	June-August	White to light pinkish	Hard sandy soil, semidesert	Leaves, seed	respiratory troubles, Ear problems, intestinal worms' impotence, sinusitis, gastric trouble	[9, 22]
Delphinium cashmerianum Royle	Ranunculaceae	Chagotpa/ Bila-mindok/ Lundekaown	Perennial herbs	3300- 4350	July-August	Purplish blue	Moist stony places, bank of irrigation canal on hard soil	Stem, flower, seed	Swelling, throat infection, dysentery, inflammation, Insecticide, wounds, colic	[9, 19, 22, 28,29, 18]
Dianthus anatolicus Boiss	Caryophyllaceae	Thangthorn/ sukpa-rigs	Perennial herbs	3400- 3800	Mid-June-August	Pinkish White	Hard, tough stony soil	Leaves	gastric trouble, cold cough, skin diseases	[9, 28, 19, 18]
Dracocephalum heterophyllum Benth	Lamiaceae	Zinzer, Zyps	Perennial herbs	4200-4830	July-September	White	Stony and gravel screes, Sandy, stabilized slopes, sandy plains	Shoot, leaves, flower	Hypertension, Peptic ulcer, Cold,	[8, 9, 19, 6]
Dracocephalum staminium Kar. & Kir.	Lamiaceae	Zinkzer	Perennial herbs	3,305-3,890	July-August	Purple blue	Stony places, screes, rocky unstable slopes	Leaves, flowers	Cough, headache	[19]
Echinops cornigerus DC	Asteraceae	Ekzima/ Sbangcher	Perennial herbs	2700- 3400	July-September	Capitula White	Hard gravel slopes, semidesert, sandy tough soil	Root, leaves, flower, seed	Septic wounds, Food poisoning, tonic,	[19, 18, 9]
Ephedra gerardiana Wall. ex Stapf	Ephedraceae	Chepaat/ Tsepath	Shrub	3200- 3540	August-September	Red Fruit	Hard, stony semidesert area,	Aerial Shoot, Fruit	Coug, heart stimulant, asthma, rheumatism, blood purifier, and menstrual irregularities. Ripened fruits are eaten directly.	[8, 28, 9, 18, 19, 6, 16, 29]
Epilobium angustifolium L	Onagraceae	Bilchank/ Utpalwampo	Perennial herbs	3000-3800	July- August	Pink to purplish	Moist slopes near villages, moist stony river beds in an alpine area	Flower, Seed	Abdominal pain, renal complaints, intestinal problems	[9, , 19, 21]
Epilobium latifolium L	Onagraceae	Bilchank/ Utpalwampo	Perennial herbs	3400-3900	July- August	Purplish pink	Bank of rivers beds near brooks, stony moist grasslands	Flower	Pimples, inflammation, Acidity,	[2, 9]
Erodium tibetanum Edgew. & Hook.f	Geraniaceae	Zemma	Annual herbs	3200-3600	Mid-June-August	White	Semidesert and desert near inhabitants, along roadsides	Flower, seed	hair tonic, indigestion, Wounds, burns	[9, 19]
Euphorbia tibetica Boiss	Euphorbiaceae	Lchanspi-raa	Perennial herbs	3200-3600	Mid-June-August	Dull yellow	Barren human-disturbed places, sandy, gravel plains, and slopes.	shoot	nausea, boils	[19, 18]
Ferula jaeschkeana Vatke	Apiaceae	Thunak/ Sampharu	Perennial herbs	2800-3400	Mid-June - September	Yellow	Subalpine and alpine slopes, rocky slopes	Root, seed	Chest trouble, , chest trouble	[9, 19]
Galium pauciflorum Willd. ex K.Schum	Rubiaceae	Rangche	Biennial herbs	3200-3700	Mid-June-July	White	Weed in fields and in villages, dumpsites, ditches, and gardens, rare in river beds among stones.	Leaves	Throat infection, fever	[9, 6]
Gentiana algida Pallas	Gentianaceae	Chukiting/ Tikta	Perennial herbs	3400- 3900	Mid-July-September	Deep blue	Open moist slopes	Flowers	Appetite, digestion, asthma, cold, cough, fever	[18, 6, 29]
Gentiana carinata (D.Don ex g D. Don) Griseb.	Gentianaceae	Chukiting	Perennial herbs	3300-3880	Blue	May-July	Open tough moist soils, bank of steams, wet soil	Whole plant	Stomach problem,	[8, 19]
Gentiana nubigena Edgew	Gentianaceae	Spangyanmentok	Perennial herbs		July-August	Dark blue	Mosses rich springs,	Leaves, flower	cold, cough, throat infection, bronchitis	[9, 19]
Gentianella moorcroftiana (Wall. ex Griseb.) Airy Shaw	Gentianaceae	Chukiting/ Chumbutik	Annual herbs	3200-4450	August-September	Light blue	Mesic slopes, plains, semi-shaded moist soil, dump soils.	Whole plant	cough, febrifuge, cold, fever, antitoxin, healing wounds, acidity, nausea, giddiness, headache,	[8, 9, 6, 28, 19, 18]
Gentianella paludosa (Hk.) H. Smith	Gentianaceae	chukiting	Annual or biennial herbs	3300-3600	Mid-June-August	Blue or yellowish	Moist damp soils, bank of irrigation canals near inhabitants.	Root	Tonic, flowers were crushed and made a fine powder. A pinch of powdered is mixed with water and boil and given to the patient to cure cold cough.	
Geranium pratense L	Geraniaceae	Poldo/ Katur	Perennial herbs	3200-4400	July- August	blue	Alpine meadows, mesic habitat near villages.	Leaf, flower	Analgesic, swelling, fever, Diarrhoea, headache, influenza, pneumonia, dysentery, intestinal bleeding	[9, 6, 19, 21, 18]
Heracleum pinnatum C.B.Clarke	Apiaceae	Khar'as / Spisho	Perennial herbs	3400-4250	June- August	White	Rocky habitats, bank of river, lakes, semidesert slopes.	Root, Seed, leaves	Skin diseases, smallpox, chickenpox, Leprosy, fever, cuts & wounds, inflammation, Tumor	[22, 9, 18]
Hippophae rhamnoides L	Elaeaganaceae	Chak-ldum /Cherma /Sastaluloo	Perennial Shrubs	2800- 3800	June-September	Greenish or Yellow	Dry to mesic habitats, rocky slopes, gravel or sandy soil, abandoned fields. River gravel deposits.	Leaves, flower, seed	Gynecological blood tumor, Lung infection, blood circulation, X, Cold, Anti-ageing, memory improvement digestion, cardiac disease, menstruation, restoration, energy-boosting. Fruit is highly bitter in taste children are found of that fruit. Children made juices of its fruit, Eating of fruit increases body temperature	[22, 19, 2, 2, 9, 21, 18, 29]
Hippophae tibetana Schltdl	Elaeaganaceae	Cherma / Chitaka	Perennial Shrubs	2800- 3800	June-September	Greenish or Yellowish	Dry to mesic habitats, rocky slopes, gravel or sandy soil, abandoned fields.	Leaves, flower, seed	rejuvenations, Revitalizing	]9]
Hyoscyamus niger L	Solanaceae	Gya-Lantang	Biennial herbs	2700-3300	July-September	Dull yellow	Wastelands, stony area, dry to mesic habitat	Leaves, seed, fruit	Toothache, headache, sedative asthma	[9, 19, 16]
Hyoscyamus pusillus L	Solanaceae	Sastalulu	Annual herbs	2800- 3600	July-September	Dull yellow	Wastelands, stony area,	leaves	diuretic, Antiseptic, expectorant	[9]

Hypecoum leptocarpum Hook. f. & Thomson	Papaveraceae	Parpata	Annual herbs	2700- 3500	Mid- June-August	White	Disturbed habitats, sandy or loamy deserts.	Root	Stomach complains, acidity	[9]
Inula obtusifolia Kerner	Asteraceae	Ripmak	Perennial herbs	3500-4100	Mid-June-August	Caoitulla Yellow	Mesic stony screes, along water streams,	leaves	internal wounds, body pains, breathing trouble	[18]
Inula racemosa Hook.f	Asteraceae	Manu	Perennial herbs	2800- 3500	July to Late August	Ray floret yellow, disc floret light red	Mesic habitat, mostly cultivated	Root, leaves	Cold, fever, gastro-intestinal complaints, Rheumatism, Acidity, chest pain,	[22, 6, 9, 19, 29]
Inula rhizocephala Schrenk	Asteraceae	Tikta /Turzit	Perennial herbs	3000- 4400	Mid- June to August	Dull yellow	Alpine streams Moist shaded places.	Whole plant	Chest trouble, cold, constipation, Stomach and intestinal ulcer	[8, 9, 6]
Iris hookeriana	Iridaceae	Kriksma /Tesma	Perennial herbs	2700- 3700	Early June-July	Light blue to violet	Moist habitat, disturbed places, mesic slopes.	Whole plant	Sedative, controls dysuria, vermifuge	[20, 20, 18]
Iris lactea Pall.	Iridaceae	Kricksma-mindok	Perennial herbs	2800- 3950	Early June-July	Bluish- Pink	Moist habitat, disturbed places, mesic slopes	Flower, seed	Sore Throat	[19]
Juniperus communis L	Cupressaceae	Shukpa	Perennial trees	2600- 3700	March-September	Fruits globose, blue-black	Rocky Mountains, near inhabitants,	Bulb, Fruit	Kidney problems, regulate urination, dysuria,	[9, 19, 20, 15]
Juniperus recurva Buch. -Ham. ex D.Don	Cupressaceae	Lha-shook	Perennial trees	2800- 3780	March-September	Fruits globose, blue-black	Rocky Mountains, near inhabitants,	Bulb, fruit	fever, kidney troubles, Diarrhea, indigestion, cough, paralysis, skin diseases	[8, 9, 19, 20]
Jurinea ceratocarpa (Dcne.)	Asteraceae	Turzith	Perennial herbs	3100- 3500	July- August	Light pink	Wet to mesic habitat, cultivated fields.	Root/ leaf	Asthma, bronchitis, wounds, Headache, joint pains, backache, lung tuberculosis, intestinal complaint, respiratory trouble, blood pressure	[9, 19, 8]
Lactuca lessertiana Wall. ex C.B.Clarke	Asteraceae	Tharnue	Perennial herbs	3740-4200	July- August	Light violet	Wet moist or damp places, bank of canals, alpine grasslands	Branch, leaves	Rheumatism	[9]
Lactuca tatarica (L.) C.A.Mey	Asteraceae	Bshakha	Perennial herbs	3750-4350	July- August	Light violet	Loamy soils often saline disturbed places, Sandy soil along roads.	Leaves	Vomiting, headache, fever, internal wounds.	[9]
Lagotis kunawurensis Rupr	Scrophulariaceae	Honglen	Perennial herbs	3800-5100	Mid-June - August	White or mauve	Open slopes, damp places, stream beds.	Root	blood purification, Fever, bile disorder, cold	[9, 19, 6]
Lancea tibetica Hook. f. & Thomson	Scrophulariaceae	Raksa	Perennial herbs	2700- 3400	Mid-July-September	Mauve	Along streams, wet grasslands, along moist stony streams.	Root, leaves, flower	cough, chest congestion, heart diseases, blood vomiting, fever, tonic	[9, 19, 6, 18, 8]
Leontopodium alpinum Colm. ex Cass	Asteraceae	Tzima	Perennial herbs	3200- 3600	Mid-June - August	Ray floret white, disc floret dull yellow	Moist to semidesert, stabilized slopes.	Whole plant	Septic wounds, headache	[9]
Lloydia serotina (L.) Rchb	Liliaceae	Tsa-wa	Perennial herbs	2870-3200	June- August	White with purplish veins	Alpine turfs, moist rock cervices, under moist rocky places, steeped meadows	Tuber, Flower	fever, Eye problems, blood purification,	[9, 19, 8]
Lycium ruthenicum Murray ex Dunal.	Solanaceae	Umila	Perennial Shrubs	2800- 3100	June- August	Purple	Screes, dry rocky slopes with sparse vegetation, gravel in river beds	Leaves	Removes blocked urine,	[8, 20]
Malva verticillata L	Malvaceae	Sochilik /Chiroti	Annual herbs	2600- 3340	June- August	White to pink	Dry to mesic disturbed habitats, field margins	Root, seed	Treatment of piles, Removes blocked urine	[9, 20]
Meconopsis aculeata Royle	Papaveraceae	Achay-na numo-mindok /AchaK-srmum	Perennial herbs	4300-4650	July-September	Blue	Alpine rocky slopes, large rock cervices, Scree, moraines, alpine meadows.	Leaf, shoot, root	Headache, ulcer, lung troubles, stomachache, healing wounds, liver problems, repairs fractured bones, pharyngitis, strengthening and recovering bone marrow	[9, 21, 28, 19, 29]
Melica persica Kunth	Poaceae	Awa	Perennial herbs	3200- 3800	Mid-June-August	White- yellow	Disturbed sandy places, along roads, dry steeps, screes,	Whole plant	joint pain, Eye irritations, rheumatism, gout,	[9]
Mentha longifolia (L.) L	Lamiaceae	Phololing	Perennial herbs	2800-3800	Mid-June-August	Violet bluish White	Alpine streams, Alpine dump soils, Alpine wet pasture, wet stony meadows, Stream and spring banks	Leaf, shoot	Dysentery, diarrhea, abdominal pains, stomach troubles, headaches, vomiting, swelling. Plant extract is also applied on swollen knees to relieve pains. Leaves were collected in the morning and sun-dried then it is used as flavoring in vegetables	[9, 18, 21, 8, 19, 22]
Myricaria elegans Royle	Tamaricaeae	Umbu	Perennial Shrubs	3200-3700	Mid-June-August	White to Pink	Stony river banks on clay and sandy soil.	Leaves	Blood purifier	[19, 26]
Nepeta coerulescens Maxim.	Lamiaceae	Kharu	Perennial herbs	3600- 4100	Mid-June-August	Pale Blue	Gravel river beds, stony river banks	Leaf	Dysentery, stomachache	[19, 21]
Nepeta discolor Royle ex Benth.	Lamiaceae	Shamlolo	Perennial herbs	3200- 3900	Mid-June-August	Lilac or white	Stabilized slopes, steppes.	leaves	Cold, cough, fever	[8, 18, 6]
Nepeta floccosa Benth	Lamiaceae	Shamagok	Perennial herbs	2850- 3300	June-September	Pinkish mauve	Stony and dry gravel slopes.	Leaves	Eye connectivity, Fever, cold-cough,	[8, 9, 6, 19]
Nepeta glutinosa Benth	Lamiaceae	Jatukpa	Perennial herbs	3600- 4300	Mid-June-August	Blue to purplish	Gravelly stabilized and unstabilized slopes, Mountain snow beds	Flower, leaves	Diarrhea, dysentery, stomachache, , pneumonia, fever	[8, 9, 19, 21]
Nepeta longibracteata Benth	Lamiaceae	Piangku / Chhagnamgo	Annual herbs	4440-5300	Mid-July-September	Violet blue	Gravel or sandy rocky mountain slopes and screes	Leaves, flower	liver problems, kidney disorders, Stomach complaints, acidity,	[9, 19, 8]
Nepeta podostachys Benth.	Lamiaceae	Apo-stwa	Perennial herbs	2800- 3500	July- August	White to dull yellow	Gravelly sandy open places, stony sandy slopes, disturbed dry places	Root, stem	Kidney disorders, enhance kidney function	[18, 19, 20]
Oxyria digyna (L.) Hill	Polygonaceae	Ree-biskur / Chumtswa	Perennial herbs	3300-4000	June- August	Greenish	Riverbanks, Stream banks	Leaves, flower, stem	Appetizer, indigestion, fever, gastric troubles. The extract of leaves is applied externally on the face and other body parts to remove pimples and black spots	[26, 9, 21, 18, 19]
Oxytropis microphylla (Pallas) DC.	Fabaceae	sTag-sha nagpo	Perennial herbs	3650- 4350	June- August	Pinkish purple	Open dry slopes	Root, flower	Joint pain	[19]
Papaver nudicaule L	Papaveraceae	Tshersngonserpo	Perennial herbs	4300- 4900	July- August	Yellow	River gravel moraines, Grassy slopes, alpine meadows	Leaves, seed	Analgesic and cold, pain reliever	[9, 18]
Paraquilegia microphylla (Royle) J.R. Drumm. & Hutch	Ranunculaceae	Yumo deujin	Perennial herbs	3800-4600	June-August	Flower white or Violet	Rock cervices, gravel screes.	Leaves, flower, seed	blood disorder, Gynecological problems, uterine tumors,	[9]
Pedicularis bicornuta Klotzsch	Scrophulariaceae	Larse-mindok /Peyasang	Perennial herbs	3100- 4300	June- August	Bright yellow	Moist damp soils, along the bank of streams, under the shade of trees in localities.	Leaves, flower	inflammation, acidity, Burns, Rheumatism, gout,	[9]
Pedicularis cheilanthifolia Schrenk	Scrophulariaceae	Shaku-chunma / Lug-ru-karpo	Perennial herbs	3700- 4200	July-August	Pinkish-red to white	Subalpine and alpine slopes.	Shoot	Stomach complaint, blood purification, dysuria	[19, 21, 18, 15]
Pedicularis longiflora Rudolph	Scrophulariaceae	Shakuchuma /Luguruk serpo	Perennial herbs	3450- 3970	July- August	Golden yellow	Moist alpine slopes, Moist wastelands	Leaves, stem	diuretic, Vertigo, dry tongue, liver, gall bladder problems, kidney disorders, excessive seminal discharge, edema	[9, 19, 20]
Peganum harmala L	Zygophyllaceae	Sepan	Perennial herbs	2500- 3200	July-August	White	Disturbed habitats along dry road banks often synanthropic in villages.	Whole plant	Fever, Stomach complaints, bladder burnt, painful urination, eye disorders, measles, asthma, and menstrual disorder,	[8, 6, 9, 21, 20, 15, 19]
Perovskia abrotanoides Kar	Lamiaceae	Iskilling/	Perennial subshrubs	2600- 3200	June- August	Violet-blue	Dry river beds among boulders.	Leaves, flower	Burning sensation, fever, cough, headache	[9, 19, 8]
Physochlaina praealta (Decne.) Miers	Solanaceae	Langtang		3000- 4100	Mid-June-August	Dull yellow	Stony area, moist rock cervices, between rock fencings in localities.	Leaf, flower, seed	Toothache, Ulcer,	[9, 18, 19, 8]
Picrorhiza kurrooa Royle ex Benth	Plantaginaceae	Kaor	Perennial herbs	3850-4200	June- August	Blue	Alpine meadows	Root, flower	antibacterial, Fever, blood purification, painful urination, kidney disorders, stomachache, promotes urination, cough, Cold fever, diabetes, jaundice	[22, 19, 6, 20, 29 15, 21, 16]

Plantago depressa Willd	Plantaginaceae	Kakarachay / Humbuksuk	Annual herbs	2800- 3900	July- August	Greenish spike	Wet abandoned soil, dump ditches, moist roadsides.	Leaves	gastric disorder, Diarrhea, fever, cold cough	[8, 9, 21, 6]
Plantago himalaica Pilg	Plantaginaceae	Kara-chay /Tharum	Perennial herbs	3400- 3990	July- August	Light greenish to creamy	Gardens, moist places, bank of streams	Seed	Diarrhea, blood purifier, hepatic problems.	[9, 26]
Plantigo major L	Plantaginaceae	Tharum/ Kakarachay		3300- 3860	July- August	Light greenish to creamy	Gardens, moist places, bank of streams, moist shady places.	Seed, leaves	toothache, gastric problems, Dysentery, gum problem	[9, 21]
Pleurospermum candollei (DC.) C.B. Clarke	Apiaceae	Rtsad-rgod)	Perennial herbs	3800- 5000	July- September	White	Alpine meadows.		Constipation, amenorrhoea, body fever, food poison	[28]
Sinopodophyllum hexandrum Royle	Berberidaceae	Dainmi-koshu / Tandik	Perennial herbs	3300-4000	May-June	White or Pink	Mesic habitats, semi shaded places mostly in villages	Flower, fruit	Skin diseases, blood dysentery, menstrual problems, uterus problems, improves blood circulation, fever, anticancerous, constipation. Fruit are eaten when ripened in Zanskar	[18, 16, 9, 22, 15, 6]
Prangos pabularia Lindl	Apiaceae	Prangos	Perennial shrub	3200- 3800	July- August	Yellow	Moist stony slopes	Fruit	indigestion, Carminative, diuretic, kidney disorders, urinary disorders, kidney inflammation, menstrual disorder.	[21, 18, 9, 15, 20]
Primula denticulate Sm	Primulaceae	Purani-mindok /Tarla-iching	Perennial shrub	3300- 3699	Mid May- July	Red pinkish to violet	Moist damp soils, Shady places turf soils.	Aerial shoot	gastric trouble, Cold, cold, headache	[9, 19]
Primula macrophylla D. Don	Primulaceae	Purani-mindok / Khi-chey	shrubs	3800- 5000	July- August	Violet to purple	Alpine meadows, snow beds, wet spring areas.	Whole plant	Cold & Cough, joint pains	[9, 19, 6]
Rheum moorcroftianum Royle	Polygonaceae	Lachoo	Perennial herb	3300- 3800	July- August	Reddish to pale yellow	Mesic alpine slopes	Root	Internal damages, Cuts, wounds	[19, 16]
Rheum *spiciforme* Royle	Polygonaceae	Lhachu	Perennial herb	3500-4800	July- August	Purplish red	Mesic alpine stony slopes	Stem, Root	Swelling wounds, Rheumatism, fever, Internal damages, chronic bronchitis, piles	[8, 2, 9, 19, 29]
Rheum webbianum Royle	Polygonaceae	Oma-khul/ Lachoo	Perennial herb	3500-4200	July- August	Pale yellow	Alpine stony mesic slopes, between boulders.	Aerial stem, Root, flower	Boils, appetizer, astringent, indigestion, purgative, abdominal disorders, cold, piles, wounds, internal infections, laxative, cuts, health improvement	[16, 29 9, 19, 31, 21, 8],
Rhodiola heterodonta (Hk. f. & Th.) Boriss.	Crassulaceae	Chik-rholo	Perennial herb	3800-5000	Mid-June-August	Greenish Yellow	Dry to stony slopes, stream banks	Shoot, root	Cough, lung infection, asthma	[19, 6]
Rhodiola imbricata Edgew	Crassulaceae	Bruk-rholo /Rholo karpo	Perennial herb	4000-5100	July September	Creamy yellow	Alpine steam banks, mesic stony alpine slopes	Shoot	Tonic, cough,	[9, 18, 19, 6]
Rosa webbiana Wall. Ex Royle	Rosaceae	She- marpo	Perennial shrubs	2500- 3800	July- August	Red	Dry sandy or gravel stony slopes, Large rock cervices.	Flower, fruit	Liver problems, jaundice, fever, Ripe fruits are edible.	[9, 9, 6]
Rumex patientia L	Polygonaceae	Shoma	Perennial herb	2600- 3600	June- August	Greenish-yellow	Bank of field margins, moist stony area in settlements	Leaves, aerial shoot	rheumatism, backache, febrifuge, skin disorder, healing wounds & cuts, pneumonitis	[9, 22]
Salix alba L	Salicaceae	Malchank	Perennial Tree	2700-3600	Mid May- June	Dark yellow to greenish	Mesic habitat, mostly cultivated.	Bulb	Fever, Knee pain, hip pains	[8, 9]
Saussurea bracteata Decne	Asteraceae	Spangsi-tawo	Perennial herb	4200-4800	Mid-July-August	Purplish red	Alpine meadows, stony moist slopes.	Leaf, flower, bud flower	Cuts & wounds, boils, headaches, cough, fever,	[9, 19, 8, 6, 29]
Saussurea costus (Falc.) Lipsch.	Asteraceae	Rulta	Perennial herb	2700-3600	July-September	Dark blue-purple	Mostly cultivated in Leh and Kargil	Root	Dysentery, ulcer, fever, cough, kidney disorders	1[9, 6, 29]
Saussurea obvallata (DC.) Edgew.	Asteraceae	Yuling	Perennial herbs	4800-5300	July- August	Head purple	Rocky slopes.	Whole plant	rheumatism, Kidney problems, wounds, pain-relieving, boils,	[16, 9, 8, 28, 18, 19]
Saussurea gnaphalodes (Royle) Sch.Bip	Asteraceae	Yuliang	Perennial herbs	4700-5800	July-August	Purple	Screes and unstable loamy and gravel slopes	Root, leaves, flower	Painful urination, depression, retard-ness, promote urination, arthritis,	[20, 9, 8]
Saussurea schultzii Hook.f	Asteraceae	Jarbag	Perennial herbs	3900- 4800	Mid-July-August	Purple capitula	Glacier moraines, rocky slopes		cough, fever, headache, throat ache	[9]
Saxifraga flagellaris Willd	Saxifragaceae	Serchen/ Sumchutik		4200- 5300	July- August	Yellow	Wet rock cervices, Alpine stony meadows.	Whole plant	Increasing life span, Fever, jaundice, hepatitis, antiseptic	[9, 19, 26]
Sedum ewersii Ledeb	Crassulaceae	Dachungpa	Perennial herbs	3600- 4400	June- August	purple	Dry to mesic slopes	Whole plant	External injury, appetizer, toothache	[9, 18, 22]
Silene tenuis Wild	Caryophyllaceae	Dakchal /Lug-suk	Perennial herbs	3800- 4500	June- August	Whitish	Alpine grasslands	Roots	Nasal problems, Hearing defects, Roots are used as soap by older people.	[22, 22]
Stachys tibetica Vatke	Lamiaceae	Yakzaz/ Churukpa	Perennial subshrub	3400- 3800	July- August	Bluish	Dry stony area.	shoot	Insecticide, control mites and lice, fever	[6, 9]
Swertia petiolata Royle ex D.Don	Gentianaceae	Runa /Zatik	Perennial herbs	4100- 4600	July-September	Greenish white variegated	Alpine moist grasslands	Whole plant	Headache, tonic, fever, gall bladder troubles	[22, 9, 26, 6]
Tanacetum gracile Hook.f. & Thomson	Asteraceae	Kham-chu	Perennial herbs	3200- 4300	July- August	Flower head yellow	Stony slopes and wastelands	Leaf, flower	Anti-worm, high fever	[9, 21]
Taraxacum officinale Webb	Asteraceae	Khrorma / Khorma-mindok	Perennial herbs	2600-4300	April- June	Yellow	Bank of cultivated fields, Moist abandoned lands, shaded moist area	Flower	Mouth blisters, liver problems, immunity booster, headache, fever, sedative, regulate urine discharge, urine burnt, cold cough, tonic,	[9, 22, 8, 16, 6, 20, 19, 21]
Thlaspi alpestre	Brassicaceae	Maakha	Perennial herbs	2700-3500	June-July	White	Weed in cultivated fields, field margins, old demolished houses, road banks		Promotes digestion, Lung inflammation, kidney inflammation, appendicitis, seminal discharge	[21, 28, 9 20, 15]
Thlaspi arvense L	Brassicaceae	Braga		2600- 3300	Mid-June-August	White	Weed in vegetable beds, disturbed fields.	Whole plant	Digestion, rheumatism, gastritis, painful urination,	[9, 15, 23]
Thymus linearis Benth	Lamiaceae	Tumburik	Perennial subshrub	3300- 3800	Mid-June-July	Lilac to purplish	Hard dry sandy soil, rock cervices	Whole plant	Stomachache, cuts, wounds, gastrointestinal problems, pregnancy,	[16, 9, 21 , 19]
Tribulus terrestris Linn	Zygophyllaceae	gZe-ma	Annual or biennial	2300- 3700	Mid- June-August	Yellow	Sandy disturbed lands near inhabitant	Fruits	Dry cough, anti-inflammatory, kidney disorders, urination troubles.	[6, 20]
Urtica hyperborea Jacq. ex Wedd	Utricaceae	Zahchot	Perennial herbs	3800- 4900	July-September	Greenish-purple	Rocky slopes, steeps, along roadsides	Whole plant	Cold & cough sores, infections, rheumatism, stomachache, sores, infections, promotes urination	[9, 2, 19, 20]
Verbascum thapsus L	Scrophulariaceae	Sman-mo-shing/ Ngo-serjee/ Dandashal	Perennial herbs	2700- 3500	July-August	Yellow	Abandoned field, disturbed lands and along roads	Leaves, seed, fruit	Diuretic, sores, infections, blood disorder, bleeding, wounds and cuts, asthma, chest pain, upper respiratory tract trouble.	[9, 2, 15, 22, 23]
Waldheimia tomentosa (Decne.) Regel.	Asteraceae	Lakhalilo /Thumba/ Palu	Perennial herbs	4300-5400	July- August	Ray floret white, disc floret yellow	Alpine stabilized slopes, rock cervices, on gravel soil deposited rocks	Leaf, flower	Septic wounds, headache, fever, bronchial troubles, arthritis.	[19, 26]

CONCLUSION

A total of 500 informants were interviewed during the current study. Male informants are composed of (55%) and female 45%. A total of 169 species (3 gymnosperms, 166 angiosperms) belonging to 41 families and 108 genera have been recorded, were used by local peoples of Ladakh UT. Most of the medicinal plants utilized by indigenous peoples belong to the family Asteraceae followed by Lamiaceae, Ranunculaceae and Apiaceae. The most plant part used were Leaves (24%) followed by flowers (20%), roots (16%), seeds (11%), and whole plant (10%). The major inhabitants of Ladakh live at an elevation of 2800- 3800m asl. From the above knowledge, it can be concluded that tribal peoples of Ladakh particularly older people possess a vast knowledge of the traditional medicinal system locally known as “Amchi’s” or “Tibetian” system of medicine. Moreover, the older section of people is effectively utilizing it to date. However, with the change in lifestyle, modernization and inadequate knowledge, adopting this traditional medicinal system by the current generation may

pose a threat to the survival of this traditional medicinal system in the future. Thus, the documentation of this current traditional system of medicine will add to its conservation and will dispense new drugs for the betterment of society. There is an immediate need to adopt Sustainable utilization, awareness programs and conservation strategies for the important medicinal plants by involving various stakeholders, universities, colleges, schools, and other various government and non-governmental organizations.

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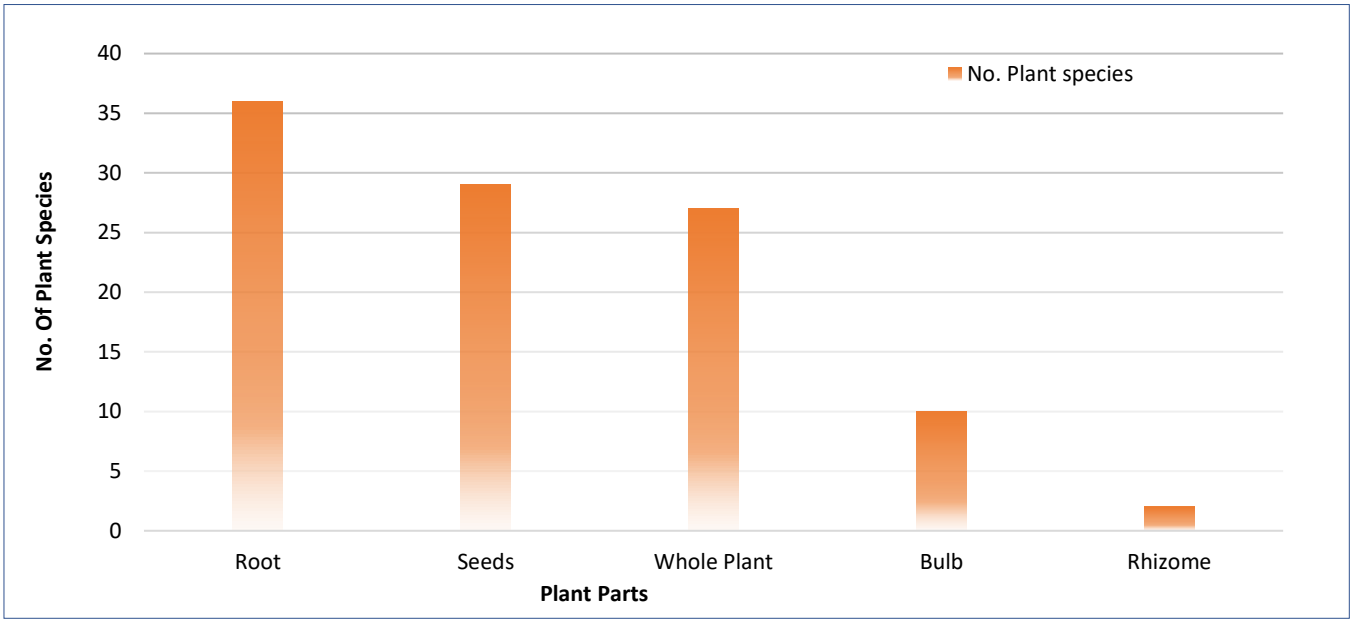

Fig 5 Plant parts collected through destructive methods

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