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RESEARCH ARTICLE

Exploration of Pharmaceutically Important Medicinal Plants in Deoria and Kushi Nagar Forest Divisions of Uttar Pradesh, India

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ABSTRACT

Objective: This article deals with the pharmaceutically important medicinal plants from Deoria and Kushi Nagar forest divisions of Uttar Pradesh to prepare documentation of the availability and distribution of medicinal plants in Deoria and Kushi Nagar districts of Uttar Pradesh.

Outcome of the study: Exploration of the two adjoining forest divisions was carried out during 2013 and 2016. During exploration, pharmaceutically important medicinal plants with their global positioning system (GPS) and potential in the field were recorded. Important medicinal plants like *Aegle marmelos*, *Andrographis paniculata*, *Bacopa monnieri*, *Celastrus paniculata*, *Centella asiatica*, *Desmodium gangeticum*, *Oroxylum indicum*, *Piper longum*, *Solanum nigrum*, *Terminalia tomentosa*, were recorded in the field.

Conclusion: The recorded plants need to be systemically utilized by the pharmaceuticals and the depleting medicinal plants from the habitat need to be commercially cultivated to fulfill the need of pharmaceuticals by the farmers by adding some other highly demanded medicinal plants having commercial value, viz., *Aloe barbadensis, Rauwolfia serpentina, Uraria picta*, etc.

Keywords: Deoria, Exploration, *Solanum nigrum*, *Terminalia tomentosa*.

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INTRODUCTION

Uttar Pradesh, the largest state of India, is located in the northern part of India bordering with the state of Bihar, in the east, Uttarakhand and Delhi in the north, and Madhya Pradesh in the west and south. It covers an area of mostly plains of Upper Gangetic plains and Bundelkhand just adjacent to Madhya Pradesh with a forest cover of tropics only. It occupies a land area of 27,16,425 km^2 and comprises 75 districts. The areas covered under extensive exploration in Uttar Pradesh are Deoria and Kushi Nagar falling into Tarai belt distinguished with the prominent river Ghaghra and its tributary Rapti. The two forest divisions are surrounded by Chhapra and Gopalganj district of Bihar in the east and north respectively, Maharajganj and Gorakhpur in the west and Mau and Ballia in the south demarcated by the river Ghaghra. Major areas are occupied by nontribal people except a few and several groups cover the migrants, namely Nepalese.

As per the State Forest Report 2003, published by the Forest Survey of India, Uttar Pradesh has a forest cover of 21,833 km^2, which is 5.8% of the total geographical area of the state. These forests receive moderate rainfall and maintain a reasonable floral and faunal biodiversity.

Authors made an extensive exploration of Deoria and Kushi Nagar forest divisions for the first time which has not yet been recorded in the past.[1-15] Exploration of ethnomedicinal plants in Kushi Nagar and Deoria forest areas has been made during 2013 to 2014 and 2016 to 2017 respectively, which had not yet been recorded in the past. The article presents the exploration of medicinal wealth with an emphasis on commercially viable medicinal plants in the explored areas. However, commercial exploration of medicinal plants with GPS location with pharmaceutical potential for conservational aspects of pharmaceutically important medicinal plants has been described for the first time in the concerned forest divisions falling under the subhill areas of Uttar Pradesh, India.

MATERIALS AND METHODS

Extensive exploration of the different districts falling under Deoria and Kushi Nagar, the two forest divisions of Uttar Pradesh, has been made. Records of the collections have been observed with GPS at different places with their distribution recorded at different spots. The herbarium vouchers were made by drying, poisoning, and mounting on herbarium sheets[16,17] and deposited in

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the herbarium of Regional Ayurveda Research Institute (acronym JHS). Authenticity of herbarium was made after consulting the herbarium of the Institute which was confirmed by comparing with the herbarium sheets kept in the herbarium of Botanical Survey of India, Allahabad. During field observation, the suitability of medicinal plants with high demand and commercial values, as well as methods for conservation, has been studied by bringing the sufficient germ plasm in the garden of Regional Ayurveda Research Institute, Jhansi. Attempts have also been made to know the potential of highly used medicinal plants in the area and the attempts made for commercialization as well as conservational aspects.

OBSERVATIONS

Extensive exploration of medicinal plants in Uttar Pradesh has been made in different seasons with an emphasis on pressure of exploitation and status as per GPS records for most of the forest areas in the state. The important medicinal plants distributed in the study areas of Deoria and Kushi Nagar forest divisions (Fig. 1) of Uttar Pradesh have been given in Table 1. Their potential in the field has also been recorded and presented through this communication.

Exploration

Exploration of medicinal plants needs the identifying areas for maximum occurrence of commercially viable species of medicinal plants, potential of such species in a particular area for commercial utility, less occurring medicinal plant species whose conservation is the need of time, utilization of medicinally important species under local health practices, or other ways of use like food, ornamental, or timber, etc., and the land suitable for undertaking medicinal plants cultivation. During various explorations in the state of Uttar Pradesh, all such types of status have been recorded. During the course of exploration, it was observed that local traditional healers are undertaking treatment of weakness, jaundice, fever, etc., by the use of locally available herbs like *A. catechu, Acacia concinna, Achyranthes aspera, Adiantum lunulatum, Aegle marmelos, Amorphophallus campanulatus, Andrographis paniculata, Alangium salvifolia, Callicarpa macrophylla, Carissa carandas, Centella asiatica, Cissampelos pareira, Coccinia indica Curcuma longa, Curculigo orchioides, Cuscuta reflexa, Datura stramonium, Desmodium gangeticum, Eclipta prostrata, Haldina cordifolia, Hemidesmus indicus, Holarrhena antidysenterica, Mallotus philippensis, Oroxylum indicum, Phyllanthus amarus, Plumbago zeylanica, Putranjiva roxburghii, Sida acuta, S. cordata, S. cordifolia, S. rhombifolia, Smilax glabra, Solanum nigrum, S virginianum, Trichosanthes dioica, Chrysopogon zizanioides,* etc. People in these areas are unaware of commercial collection and marketing of medicinal plants, as most of the areas are agriculture land. Totally 183 plants distributed in the areas of study cover 75 species of herbs, 41species of shrubs, 51 species of trees, and 16 species of climbers (Graph 1). Distribution of medicinal plants in different studied forest areas falling under Deoria and Kushi Nagar forest divisions as per GPS markings is described in Table 1. Maximum number of plants used in various diseases and disorders are used in gastrointestinal disorders, i.e., 56, which in turn is followed by 29 for respiratory diseases, 14 for fever, 10 for diabetes and malnutrition, 9 for hepatic disorders, 8 as aphrodisiac tonic and urogenital complains, 6 for arthritis, 5 as nervine tonic, 4 as cardiac tonic, and 2 for cancer, eye diseases and as blood purifier, all of which have been shown in Graph 2.

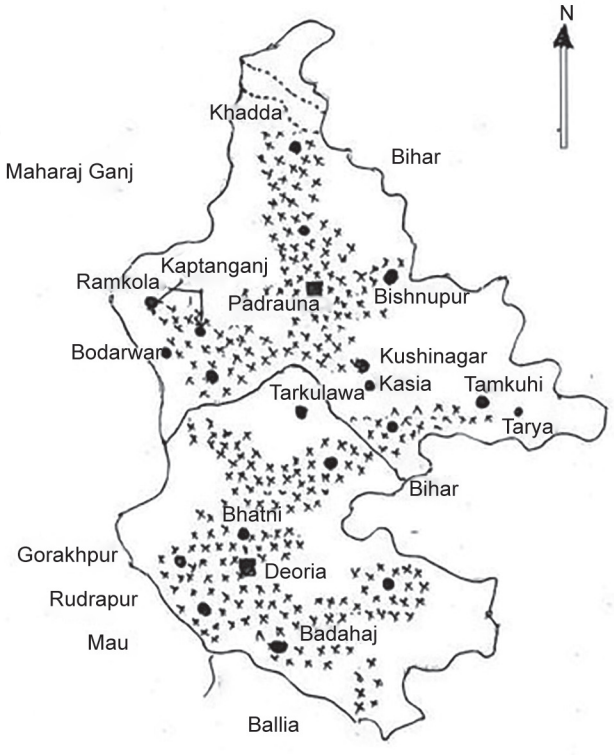

Fig. 1: Map of Deoria and Kushi Nagar showing areas under study

CONSERVATION

Conservation of medicinal plants in sub-Himalayan region of Uttar Pradesh to which the study areas belong, is needed for enriching the locally available medicinal plants in their vicinity which have commercial value, as it is a fact that due to shortage of plant for the root of *Desmodium gangeticum,* the whole plant is traded in market with three different plants in different markets in the name of Shalparni. For a better conservation of medicinal plants in the area, there is an urgent need for establishing some village-level volunteers having sufficient land for establishing nurseries and germ-plasm bank of commercially viable medicinal plants.

Table 1: Distribution of medicinal plants in Deoria and Kushi Nagar forest divisions

Botanical name and family	*Family*	*Vern. name*	*Collection No.*	*Locality*	*GPS*	*Related disorder*
Abrus precatorius L.	Leguminosae	Gunja, Ghumchi	9727	Jangal Jhukuri (D)	N26° 27.349, E083° 41.932	Gastrointestinal disorders, such as diarrhea including dysentery
Abutilon indicum L.	Malvaceae	Atibala, Kanghi	7740	Kulkula (KN)	N26° 40.780, E083° 57.639	Aphrodisiac tonic
			9651	Deoria Kushi Nagar	N26° 35.455, E083° 46.610	
Acacia catechu (L.f.) Willd.	Mimosaceae	Khadir, Khair	7671	Arnahaba (KN)	N26° 54.256, E084° 02.160	Hypoglycemic
			9677	Salempur (D)	N26° 19.292, E083°56.359	
A. concinna (Willd.) DC.	Mimosaceae	Saptala, Shikakai	7733	Dhanipatti (KN)	N26° 42.506, E083° 57.632	Respiratory disorders
Acalypha indica L.	Euphorbiaceae	Haritmanjari	7754	Ahirauli (KN)	N26° 50.070, E084° 09.025	Respiratory disorders
			9640	Deoria-Kushi Nagar (D)	N26° 34.434, E083° 49.412	
Achyranthes aspera L.	Amaranthaceae	Apamarga, Chirchiri	7708	Rajjabar (KN)	N26° 42.301, E083° 59.679	Gastrointestinal disorders
Acmella oleracea (L.) R.K. Jansen	Compositae	Akarkara	7750	Dalipnagar (KN)	N26° 18.976, E83° 35.867	Anticaries
A. uliginosa (Sw.) Cass.	Compositae	Akarkara	9628	Rampur (D)	N26° 34.528, E083° 49.685	Toothache
Acorus calamus L.	Acoraceae	Vacha	7672	Arnahaba (KN)	N26° 54.254, E084° 02.158	Respiratory disorders, cardiac tonic
Adiantum lunulatum Burm.f.	Pteridaceae	Hanspadi	7755	Ahirauli (KN)	N26° 50.097, E084° 08.996	Respiratory disorders
Aegle marmelos (L.) Correa	Rutaceae	Bilva	7660	Shahpur (KN)	N26° 54.533, E084° 02.793	Gastrointestinal disorders, diabetes
			9676	Salempur (D)	N26° 19.292, E083° 56.359	
Aerva lanata L. Juss.	Amaranthaceae		7735	Dhanipatti (KN)	N26° 42.735, E083° 57.236	Kidney stone, antilithic
Agave americana L.	Asparagaceae		9713	Rudrapur (D)	N26° 28.190, E083° 43.679	Nervine tonic
Alangium salvifolia (L.f.) Wangerin	Alangiaceae	Ankola	7665	Shahpur (KN)	N26° 54.537, E084° 02.732	Gastrointestinal disorders, worm infestation
			9666	Shawaldas Dham (D)	N26° 19.517, E083° 56.572	
Albizia lebbeck (L.) Benth.	Mimosaceae	Svet Shirish	9629	Jangal Jhukuri (D)	N26° 34.528, E083° 49.685	Respiratory disorders
Alocasia indica Schott.	Acoraceae	Arvi	9626	Deoria (D)	N26° 34.528, E083° 49.685	Gastrointestinal disorders
Alstonia scholaris (L.) R.Br.	Apocynaceae	Saptaparn, Chhitaunni	7523	Alidapur (KN)	N26° 54.546, E084° 2.849	Malaria, fever
			9701	Bhatni (D)	N26° 22.899, E083° 56.166	
Alternanthera sessilis (L.) R.Br. ex DC.	Amaranthaceae	Matsyakshi, Gidani	7656 9623	Shahpur (KN) Deoria	N26° 34.528, E083° 49.685	Gastrointestinal disorders
Amaranthus spinosus L.	Amaranthaceae	Tanduliyak, Kantili Chaulai	9638	Baitalpur Road	N26° 34.434, E083° 49.412	Gastrointestinal disorders
A. viridis L.	Amaranthaceae	Jangali Chaulai	9654	Deoria-Kushi Nagar	N26° 34.434, E083° 49.412	Gastrointestinal disorders
Andrographis paniculata Nees.	Acanthaceae	Kalmegh, Chirayata	7724	Dahripatti (KN)	N-26° 41.945, E083° 59.928	Hepatic disorders

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Botanical name and family	Family	Vern. name	Collection No.	Locality	GPS	Related disorder
Annona squamosa L.	Annonaceae	Gandgatra, Sharifa	7728	Sariaya Mahant Patti	N26° 41.398, E083° 58.761	Malnutrition
			9731	Jangal Jhakhuri (D)	N26° 26.946, E083° 41.811	
Artemisia parviflora Roxb.	Compositae	Damanak, Davana	7723	Dehripatti (KN)	N26° 41.928, E083° 59.930	Fever
Artocarpus integrifolia L.	Moraceae	Panas, Katahal	7721	Dehripatti (KN)	N26° 41.943, E083° 59.947	Malnutrition
			9706	Bhatni (D)	N26° 27.130, E083° 49.136	
A. lakoocha Roxb.	Moraceae	Lakuch, Badahar	7748	Dalip Nagar (KN)	N26° 18.020, E83° 35.854	Malnutrition
Arundo donax L.	Poaceae	Nala, Narakat	7678	Deoria Kushi	N26° 54.445, E084° 02.206	Urinary disorders, diuretic, tonic
			9642	Nahar (D)	N26° 34.434, E083° 49.412	
Azadirachta indica A. Juss.	Meliaceae	Nimb, Neem	9775	Magahar (D)	N26° 11.112, E083° 52.634	Fever, skin diseases
Bacopa monnieri (L.) Wettst.	Scrophulariaceae	Brahmi	7652	Shahpur (KN)	N26° 54.535, E084° 02.874	Nervine tonic, gastrointestinal disorders
Bambusa bambos (L.) Voss.	Poaceae	Vansh, Bans	9740	Jangal Jhukri (D)	N26° 26.566, E083° 38.442	Respiratory diseases, bleeding
			7730	Sariaya Mahant Patti (KN)	N26° 41.413, E083° 58.763	Respiratory diseases, bleeding
Basella alba L.	Basellaceae	Upodika, Poi	9637	Bossgaon (KN)	N26° 49.747, E084° 09.671	Malnutrition
				Baitalpur Road (D)	N26° 34.528, E083° 49.685	
Bauhinia purpurea L.	Leguminosae	Kovidar	9672	Shawaldas Dham (D)	N26° 19.946, E083° 53.545	Respiratory diseases, throat disorders
Boerhavia diffusa L.	Nyctaginaceae	Punarnava, Gadahpunna	7747	Dalipnagar (KN)	N26° 18.986, E83° 35.841	Hepatic disorders, urogenital diseases
			9766	Meethawel	N26° 32.198, E083° 34.765	
Bombax ceiba L.	Bombacaceae	Shalmali, Semal	7731	Sariaya Mahant Patti	N26° 41.415, E083° 58.783	Urogenital diseases, aphrodisiac tonic
			9705	Bhatni (D)	N26° 26.964, E083° 49.136	
Bryophyllum pinnatum (Lam.) Kurze	Crassulaceae	Parnabeej, Ajuba	7722	Dahripatti (KN)	N26° 41.923, E083° 59.934	Renal diseases/kidney stone
Butea monosperma (Lam.) Taub.	Leguminosae	Palash, Dhak	9717	Jangal Jhakhuri (D)	N26° 28.792, E083° 41.672	Urinary disorders, worm infestation
Caesalpinia bonduc (L.) Roxb.	Leguminosae	Latakaranj, Kantakikaranj	7658	Shahpur (KN)	N26° 54.539, E084° 02.791	Hepatic diseases, fever
Cajanus cajan L.	Leguminosae	Adhaki, Arhar	7732	Dhanipatti (KN)	N26° 41.415, E083° 58.783	Lactation deficiency
Calamus rotang L.	Arecaceae	Vetra, Vet	7742	Kukkula (KN)	N26° 40.744, E083° 57.779	Fever
Callicarpa macrophylla Vahl.	Verbenaceae	Priyangu	7675	Arnahaba (KN)	N26° 54.256, E084° 02.160	Rheumatism
Calotropis gigantea (L.) Dryand.	Asclepiadaceae	Svetark, Madar	9722	Jangal Jhukuri (D)	N26° 28.659, E083° 41.716	Respiratory diseases
C. procera (Aiton) Dryand.	Asclepiadaceae	Arka, Madar	9633	Baitalpurr Road (D)	N26° 34.240, E083° 47.807	Respiratory diseases
Cannabis sativa L.	Cannabinaceae	Bhanga	9653	Hata area (D)	N26° 34.528, E083° 49.685	Gastrointestinal disorders

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Botanical name and family	*Family*	*Vern. name*	*Collection No.*	*Locality*	*GPS*	*Related disorder*
Capparis zeylanica L.	Capparidaceae	Vyaghranakhi, Kareruwa	7739	Kulkula (KN)	N26° 40.890, E083° 57.645	Boil, swelling
			9763	Khoram (D)	N26° 35.156, E083° 37.538	
Carissa carandas (L.)	Apocynaceae	Karmard, Karavan	7727	Sariaya Mahant Patti, Kasya range	N26° 41.961, E083° 59.917	Gastrointestinal disorders
C. spinarum L.	Apocynaceae	Jangali Karavan	7749	Dalipnagar (KN)	N26° 18.985, E83° 35.861	Gastrointestinal disorders
			9664	Shawaldas Dham (D)	N26° 19.517, E083° 56.572	
Cascabela thevetia (L.) Lippold.	Apocynaceae	Peet Karvir, Kandail	9738	Jangal Jhukuri (D)	N26° 28.190, E083° 42.679	Insect repellent
Cassia fistula L.	Leguminosae	Aragvadha, Amaltas	7702	Kasaya (KN)	N26° 42.240, E083° 59.661	Gastrointestinal disorders
			9747	Rudrapur (D)	N26° 35.448, E083° 41.382	
Catunaregam spinosa (Thunb.) Tirveng.	Rubiaceae	Madana, Mainhar	7744	Kulkula (KN)	N26° 16.882, E83° 31.774	Fever
Cayaponia laciniosa (L.) C. Jeffrey	Cucurbitaceae	Shivlingi	7745	Dalipnagar (KN)	N26° 16.114, E83° 31.797	Gastrointestinal disorders
			9704	Bhatni (D)	N26° 24.807, E083° 53.625	
Cayratia trifolia (L.) Domin	Vitaceae	Atyamlapari	9733	Usara Bazar (D)	N26° 26.767, E083° 37.533	Gastrointestinal disorders
Celastrus paniculatus Willd.	Celastraceae	Jyotishmati	7751	Dalipnagar (KN)	N26° 18.963, E83° 35.881	Gastrointestinal disorders
Celosia argentea L.	Amaranthaceae	Shitivarak, Safed Murga Ramdana	9673	Shawaldas Dham (D)	N26° 19.946, E083° 53.545	Nutritious
C. cristata L.	Amaranthaceae	Shitivarak	9725	Jangal Jhukuri (D)	N26° 27.183, E083° 43.053	Nutritious
Centella asiatica (L.) Urban	Apiaceae	Mandukparni, Brahmi	7679	Arnahabha (KN)	N26° 54.499, E084° 02.199	Gastrointestinal disorders, nervine tonic
Chrozophora rottleri A. Juss.	Euphorbiaceae	Suryavarta	9759	Laxmipur (D)	N26° 30.064, E083° 42.747	Skin diseases
Chrysopogon zizanioides (L.) Robert.	Poaceae	Ushir, Khas	9668	Shawwaldas Dham (D)	N26° 19.484, E083° 56.874	Fever, joint pain
Ceiba pentandra (L.) Gaertn.	Bombacaceae	Svet Shalmali, Semal	9660	Salempur (D)	N26° 19.517, E083° 56.572	Aphrodisiac tonic, stimulant
Cissampelos pareira L.	Menispermaceae	Patha	7709	Rajjabar (KN)	N26° 42.313, E083° 59.690	Fever
Clerodendrum indicum (L.) Katz.	Verbenaceae	Bharangi	7746	Dalipnagar (KN)	N26° 40.973, E083° 57.838	Gastrointestinal disorders, such as worm infestation
C. infortunatum L.	Verbenaceae	Bhandir, Bharangi	7686	Arnahaba (KN)	N26° 54.374, E84° 02.059	Gastrointestinal disorders, such as worm infestation
			9627	Deoria	N26° 34.528, E083° 49.685	
Colebrookea oppositifolia Sm.	Lamiaceae	Binda, Pansara	7659	Shahpur (KN)	N26° 54.541, E084° 02.795	Respiratory diseases, such as cough, gastrointestinal disorders, such as dysentery, worm infestation
Coccinia indica Wight & Arn.	Cucurbitaceae	Bimbi	9708	Alulwal (D)	N26° 26.570, E083° 46.159	Diabetes, skin diseases
Coix lacryma-jobi L.	Poaceae	Gavedhuka	9734	Jangal Jhukuri (D)	N26° 26.658, E083° 38.092	Obesity

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Botanical name and family	Family	Vern. name	Collection No.	Locality	GPS	Related disorder
Cordia myxa Roxb.	Boraginaceae	Sleshmatak, Lasora	7668	Shahpur (KN)	N26° 54.509, E084° 02.781	Respiratory diseases
Crotalaria juncea L.	Leguminosae	Shana, Sanai	7717	Dahripatti (KN)	N26° 41.922, E083° 59.034	Blood, skin diseases
			9709	Gopalapur (D)	N26° 26.570, E083° 48.159	
Croton bonplandi-anum Baill.	Euphorbiaceae		9680	Bhatni (D)	N26° 18.276, E083° 54.465	Skin diseases
Curculigo orchioides Gaertn.	Hypoxidaceae	Talmuli	7801	Rajjabar (KN)	N26° 54.048, E84° 26.937	Aphrodisiac
			9728	Shawaldas Dham (D)	N26° 27.349, E083° 41.932	
Curcuma longa L.	Zingiberaceae	Haridra	7698	Shahpur (KN)	N26° 54.055, E84° 02.917	Respiratory diseases, pain
Cuscuta reflexa Roxb.	Cuscutaceae	Akashvalli, Amarvela	7644	Shahpur (KN)	N26° 54.386, E084° 02.637	Gastrointestinal disorders, such as worm infestation
			9636	Baitalpur Road (D)	N26° 34.276, E083° 47.335	
Cyanthillium cinereum (L.) Robb.	Compositae	Sahdevi	7756	Ahirauli (KN)	N26° 50.161	Respiratory diseases
			9617	Deoria	N26° 34.528, E083° 49.685	
Cyclea peltata Diels.	Menispermaceae	Rajpatha	7647	Shahpur (KN)	N26° 54.458, E084° 02.747	Inflammation, blood purification, nervine tonic
Dalbergia sissoo Roxb.	Leguminosae	Shinshima, Shisham	9753	Mithabil-Rudrapur (D)	N26° 35.156, E083° 37.538	Gynecological disorders
Datura metel L.	Solanaceae	Krishna Dhattura	7725	Dahripatti (KN)	N26° 41.951, E083° 59.921	Respiratory diseases, such as asthma
			9699	Bhatni (D)	N26° 30.281, E083° 47.113	
D. stramonium L.	Solanaceae	Dhattura	7673	Arnahaba (KN)	N26° 54.252, E084° 02.158	Respiratory diseases, such as asthma
			9674	Salempur (D)	N26° 19.946, E083° 53.545	
Dendrophthoe falcata (L.f.) Ettin.	Loranthaceae	Banda, Pasar banda	9761	Laxmipur (D)	N26° 30.188, E083° 43.853	Uterine tonic, respiratory diseases
Desmodium gangeticum DC.	Leguminosae	Shalparni	7695	Shahpur (KN)	N26° 54.108, E84° 02.881	Tonic, fever
			9685	Rampur (D)	N26° 19.502, E083° 56.577	
D. pulchellum (L.) Benth.	Leguminosae	Shalparni	7734	Dhanipatti (KN)	N26° 42.803, E083° 57.179	Gastrointestinal disorders, such as diarrhea
Dioscorea bulbifera L.	Dioscoreaceae	Varahikand	7662	Shahpur (KN)	N26° 54.543, E084° 02.785	Tonic, respiratory diseases
Diospyros melanoxylon R. Br.	Ebenaceae	Tenduk	9671	Shawaldas Dham (D)	N26° 19.484, E083° 56.874	Gastrointestinal disorders, respiratory diseases
Eclipta prostrata (L.) L.	Compositae	Bhringraj, Bhangaraia	9741	Jangal Jhukuri (D)	N26° 28.083, E083° 43.101	Gastrointestinal disorders
Eichornia crassipes (Mart.) Solms.	Pontederiaceae	Jalkumbhi	9750	Kalhuwar-Gauri (D)	N26° 35.256, E083° 41.514	Gastrointestinal disorders, such as diarrhea
Elephantopus scaber L.	Compositae	Gojihva	7736	Kulkulla (D)	E083° 57, N26° 42.164	Cardiac tonic, intestinal
Eupatorium triplinervia Vahl.	Compositae	–	7674	Arnahaba (KN)	N26° 54.256, E084° 02.160	Wound, bleeding
Euphorbia hirta L.	Euphorbiaceae	Brihhat dugdhika, Duddhi	7758	Ahirauli (KN)	E084° 08.956	Skin diseases
E. neriifolia L.	Euphorbiaceae	Snuhi, Senhur	9764	Deoria-Kushi Nagar (D)	N26° 32.198, E083° 34.765	Respiratory diseases

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Botanical name and family	*Family*	*Vern. name*	*Collection No.*	*Locality*	*GPS*	*Related disorder*
Ficus benghalensis L.	Moraceae	Vata, Baragad	7762	Bossgaon (KN)	N26° 49.761, E084° 09.641	Gastrointestinal disorders
			9697	Bhatni (D)	N26° 30.281, E083° 47.113	
F. hispida L.f.	Moraceae	Kashth Udumbar	7676	Arnahaba (KN)	N26° 54.382, E084° 02.205	Gastrointestinal disorders
Ficus lacor Buch.-Ham.	Moraceae	Plaksha	9696	Bhatni (D)	N26° 30.281, E083° 47.113	Gastrointestinal disorders
F. racemosa L.	Moraceae	Udambar, Gular	9752	Baijudih (D)	N26° .35.103, E083° 41.944	Gastrointestinal disorders
F. religiosa L.	Moraceae	Ashvatha, Pipal	7657	Shahpur (KN)	N26° 54.536, E084° 02.789	Gastrointestinal disorders
			9695	Bhatni (D)	N26° 30.281, E083° 47.113	
Flacourtia indica (Burm. f.) Merr.	Flacourtiaceae	Vikankat	9616	Deoria	N26° 34.528, E083° 49.685	Hepatic diseases, jaundice
Fumaria indica (Hausskn.) Pugsley	Papaveraceae	Parpat	9681	Salempur Range Office (D)	N26° 19.359, E083° 56.876	Respiratory disorders
Glycosmis pentaphylla (Retz.) DC.	Rutaceae	Jangali Nimbu	7719	Dahripatti (KN)	N26° 41.91, E083° 59.025	Fever
Grangea maderasapatana (L.) Poir.	Compositae	Mustaru	9757	Laxmipur-Sudama	N26° 30.297, E083° 38.004	Gastrointestinal disorders, stomach ache, eye disease
Haldina cordifolia (Roxb.) Ridsdale.	Rubiaceae	Haridru, Haldu	7711	Madhutiya (KN)	N26° 42.371, E083° 59.753	Skin diseases
Helicteres isora L.	Malvaceae	Avartani, Marod phalli	9662	Shawaldas Dham (D)	N26° 19.517, E083° 56.572	Gastrointestinal disorders
Hemidesmus indicus (L.) R. Br.	Asclepiadaceae	Sariva, Duddhi	7752	Dalipnagar (KN)	N26° 18.961, E83° 35.892	Rheumatoid arthritis
Hibiscus abelmoschus L.	Malvaceae	Lata Kasturi, Vanabhindi	7693	Shahpur Padrona range (KN)	N26° 54.358, E84° 02.087	Aphrodisiac tonic
H. rosa sinensis L.	Malvaceae	Japa, Gudahal	9777	Salempur (D)	N26° 11.112, E083° 52.634	Hair, contraceptive
Holarrhena pubescens Wall. Ex G. Don	Apocynaceae	Kutaj,	9716	Gopalpur (D)	N26° 28.722, E083° 41.662	Gastrointestinal disorders, such as dysentery
Hyptis suaveolens Poit.	Lamiaceae	Vanatulsi	7689	Ambabaha (KN)	N26° 54.257, E84° 02.054	Respiratory diseases
			9765	Laxmipur (D)	N26° 35.114, E083° 37.715	
Ichnocarpus frutiscens R. Br.	Apocynaceae	Sariva, Kali Duddhi	7667	Shahpur Padarauna (KN)	N26° 54.542, E084° 02.832	Gastrointestinal disorders, fever
			9718	Jangal Jhukuri (D)	N26° 28.747, E083° 41.680	
*Ipomoea aquatic*a Forsk.	Convolvulaceae	Nadika, Kalmi	9648	Baitalpur-Hata (D)	N26° 35.623, E083° 46.579	Tonic, eye diseases
I. batata Lam.	Convolvulaceae	Ganji	7700	Shahpur (KN)	N26° 54.038, E84° 02.941	Malnutrition
Jatropha curcas L.	Euphorbiaceae	Bagharend	9735	JangalJhukuri (D) Do	N26° 26.566, E083° 38.442	Skin diseases
Justicea adhatoda L.	Acanthaceae	Vasaka, Adusa	7761	Bossgaon (KN)	N26° 49.765, E084° 09.632	Respiratory diseases, rheumatism, worm infestation
			9707	Khukhunda (D)	N26° 26.570, E083° 48.159	
Lawsonia inermis L.	Lythraceae	Mehandi Madyantika	7763	Salempur Range (D)	N26° 34.864, E083° 42.236	Skin diseases, diabetes

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Botanical name and family	*Family*	*Vern. name*	*Collection No.*	*Locality*	*GPS*	*Related disorder*
			9743	Jangal Jhukuri (D)	N26° 26.566, E083° 38.442	
Leonotis nepetaefolia (L.) R. Br.	Lamiaceae	Hajurchie	9736	Jangal Jhukuri (D)	N26° 26.658, E083° 38.359	Respiratory diseases, such as asthma
Leucas aspera Spreng.	Lamiaceae	Goom	7650	Shahpur Padarauna (KN)	N26° 54.554, E084° 02.830	Respiratory diseases: Sinusitis, gastrointestinal disorders
L. cephalotes Spreng.	Lamiaceae	Dronpushpi, Gooma	7646	Shahpur (KN)	N26° 54.401, E084° 2.724	Respiratory diseases: Sinusitis, hepatic
L. indica (L.) Vatake	Lamiaceae	Dronapushpi	9693	Salempur (D)	N26° 19.502, E083° 56.577	Respiratory diseases: Sinusitis, hepatic
Limonia acidissima L.	Rutaceae	Kappitthapatri, Kainth	9683	Sh. Savaldas Dham Rd.	N26° 19.502, E083° 56.577	Gastrointestinal disorders, such as diarrhea. Respiratory diseases, such as asthma
Lygodium flexuosum (L.) Sw.	Marattiaceae	Kalijhanta	9667	Shawaldas Dham (D)	N26° 19.484, E083° 56.874	Skin diseases, respiratory diseases
Madhuca longifolia (J. Conig.) J.F. Macbr.	Sapotaceae	Madhuk, Mahua	9749	Navikpur (D)	N26° 35.114, E083° 41.715	Tonic
Mallotus philippensis (Lam.) Muel.-Arg.	Euphorbiaceae	Kampillak, Roina	7697	Shahpur, Padaraua (KN)	N26° 54.328, E84° 02.794	Gastrointestinal disorders, such as worm infestation
			9692	Bhatni (D)	N26° 19.504, E083° 56.812	
M. nudiflorus (L.) Kulzu & Welzen	Euphorbiaceae	Gutel	9643	Rampur (D)	N26° 34.434, E083° 49.412	Swelling, rheumatism
Mangifera indica L.	Anacardiaceae	Amra	9719	Jangal jhukuri (D) Kasaya (KN)	N26° 28.718, E083° 41.626	Tonic
Marsilea minuta L.	Marsileaceae		7655	Shahpur (KN)	N26° 42.236, E083° 59.662	Nervine tonic
			9712	Gopalpur (D)	N26° 28.083, E083° 43.101	
Melia azedarach L.	Meliaceae	Mahanimba	7645	Shahpur (KN)	N26° 54.383, E084° 02.664	Skin diseases, diabetes
			9746	Rudrapur (D)	N26° 35.304, E083° 41.618	
Mitragyna parviflora (Roxb.) Kurth.	Rubiaceae	Dhara Kadamb	7696	Shahpur (KN)	N26° 54.236, E84° 02.850	Fever, swelling
			9689	Salempur (D)	N26° 19.502, E083° 56.577	
Moringa oleifera Lam.	Moringaceae	Shigru	9698	Salempur (D)	N26° 30.281, E083° 47.113	Hepatic diseases
Morus alba L.	Moraceae	Tood	9744	Rudrapur (D)	N26° 34.864, E083° 42.236	Gastrointestinal disorders
Murraya koenigii (L.) Spreng.	Rutaceae	Kaidarya	7664	Shahpur (KN)	N26° 54.544, E084° 02.789	Gastrointestinal disorders
Neolamarckia cadamba (Roxb.) Bosser	Rubiaceae	Kadamba	9630	Deoria	N26° 34.528, E083° 49.685	Gastrointestinal disorders
Nyctanthus arbortristris L.	Nyctaginaceae	Shephalika	9760	Laxmipuur (D)	N26° 30.188, E083° 43.853	Fever, malaria, rheumatism
Ocimum canum Sims	Lamiaceae	Vana Tulsi	7760	Bossgaon (KN)	N26° 49.811, E084° 09.619	Respiratory
Oplismanus burmannii (Retz.) P. Beauv.	Poaceae	Vansapatri	9687	Shawaldas Dham (D)	N26° 19.502, E083° 56.577	Wounds, bleeding

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Botanical name and family	*Family*	*Vern. name*	*Collection No.*	*Locality*	*GPS*	*Related disorder*
Oroxylum indicum (L.) Vent.	Bignoniaceae	Shyonak	7720	Dahri Patti (KN)	N26° 41.950, E083° 59.013	Cancer, hepatic diseases
			659	Shawaldas Dham (D)	N26° 19.517, E083° 56.572	
Oxalis corniculata L.	Oxalidaceae	Changeri, Tinpatia	7707	Rajjabar Kasya (KN)	N26° 42.300, E083° 59.671	Gastrointestinal disorders
			9755	Laxmipur (D)	N26° 30.297, E083° 38.004	
Peristrophe bicalyculata Nees	Acanthaceae	Kakjangha	7704	Rajjabar (KN)	N26° 42.256, E083° 59.672	Snake bite
			9618	Deoria	N26° 34.528, E083° 49.685	
Phyla nodiflora (L.) Green	Verbenaceae	Jalpippali	7682	Arnahaba (KN)	N26° 54.549, E084° 02.997	Skin diseases
Phoenix sylvestris (L.) Roxb.	Acoraceae	Kharjura, Khajur	7737	Kulkula (KN)	N26° 40.140, E083° 57.785	Gastrointestinal disorders, tonic
			9691	Bhatni (D)	N26° 19.441, E083° 56.847	
Phyllanthus amarus Schum. & Greene	Euphorbiaceae	Bhumyamlaki	9686	Salempur (D)	N26° 19.394, E083° 56.870	Hepatic diseases
P. reticulatus Poir.	Euphorbiaceae		9631	Deoria-Kushi Nagar (D)	N26° 34.528, E083° 49.685	Gastrointestinal disorders
Physalis minima L.	Solnaceae	Chimpota	7649	Shahpur (KN)	N26°54.514, E084° 02.825	Gastrointestinal disorders
			9770	Magahar (D)	N26° 19.658, E083° 50.860	
Piper longum L.	Piperaceae	Pippali, Pippar	7738	Kulkula (KN)	N26° 040.058, E083° 57.734	Respiratory diseases, gastrointestinal disorders
Pithecellobium dulce (Roxb.) Benth.	Leguminosae	Jangal Jalebi	9678	Bhatni (D)	N26° 19.292, E083° 56.359	Hair, diabetes
Plumbago zeylanica L.	Plumbaginaceae	Chitrak, Chita	7670	Arnahaba (KN)	N26° 54.371, E084° 02.650	Gastrointestinal disorders
			9773	Karkati (KN)	N26° 12.051, E083° 51.916	
Pongamia pinnata L.) Pierre	Leguminosae	Karanj	9821	Rampur-Deoria (D)	N26° 34.528, E083° 49.685	Skin diseases
Rauvolfia canescens L.	Apocynaceae	Sarpagandha bhed	7753	Ahirauli (KN)	N26° 50.083, E084° 09.050	Insomnia, hypertension
Rungia parviflora Nees	Acanthaceae	Parpat	9625	Deoria-Rampur (D)	N26° 34.528, E083° 49.685	Respiratory diseases
Saccharum benghalensis Retz.	Poaceae	Shara, Munj, Sarapat	7705 9703	Rajjabar (KN) Salempur (D)	N26° 42.288, E083° 59.680 N26° 24.867, E083° 56.625	Urolitholitic
Saccharum spontaneum L.	Poaceae	Kash	9769	Mithabali II (D)	N26° 19.658, E083° 50.860	Urolitholitic
Salvia plebeia R. Br.	Lamiaceae		9737	Jangal Jhukuri (D)	N26° 28.792, E083° 41.672	Antioxidant
Scoparia dulcis L.	Scrophulariaceae	Mithi patti	7654	Shahpur (KN)	N26° 34.528, E083° 49.685	Gastrointestinal disorders hypoglycemic, diabetes
			9622	Rampur (D)	N26° 54.542, E084° 02.831	
Semecarpus anacardium L.f.	Anacardiaceae	Bhallatak	9724	Jangaljhukuri (D)	N26° 28.624, E083° 41.700	Anti-inflammatory, antibiotic
Senna alata L.	Leguminosae	Dad mardan	9632	Deoria-Kushi Nagar (D)	N26° 34.240, E083° 47.807	Skin diseases
S. occidentalis L.	Leguminosae	Kasamarda	7661	Shahpur (KN)	N26° 54.548, E084° 02.82	Skin diseases

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Botanical name and family	*Family*	*Vern. name*	*Collection No.*	*Locality*	*GPS*	*Related disorder*
S. sophera L.	Leguminosae	Kasamarda	7690	Arnahaba (KN)	N26° 54.236, E84° 02.057	Skin diseases
			9652	Deoria-Rampur (D)	N26° 34.528, E083° 49.685	
S. tora L.	Leguminosae	Chakramarda	7677	Arnahaba (KN)	N26° 54.382, E084° 02.205	Skin diseases
Sida acuta L.	Malvaceae	Bala, Briyarr	77129644	Deoria-Rampur (D)	N26° 42.318, E083° 59.812 N26° 34.434, E083° 49.412	Hepatoprotective tonic
S. cordata (Burm.f.) Boiss.	Malvaceae	Bhumi Bala	7688	Arnahaba (KN)	N26° 54.278, E84° 02.027	Hepatoprotective tonic
			9729	Jangaljhukuri (D)	N26° 27.326, E083° 41.908	
S. cordifolia L.	Malvaceae	Bala	9558	Shavaldas Dham (D)	N26° 42.218, E083° 59.752	Hepatoprotective tonic
S. rhombifolia L.	Malvaceae	Mahabala, Bariyar		Madhuriya (KN)	N26° 54.539, E084° 02.732	Hepatoprotective tonic
Solanum indicum Roxb.	Solanaceae	Brihati	7666	Shahpur (KN)		Gastrointestinal disorders, respiratory diseases
S. nigrum L.	Solanaceae	Kakmachi, Makoy	9641	Deoria-Kushi Nagar (D)	N26° 34.434, E083° 49.412	Gastrointestinal disorders
S. viarum Dunal	Solanaceae	Kantskari	7669	Arnahaba Padrona range (KN)	N26° 54.515, E-084° 02.783	Respiratory diseases
S. verbascifolium L.	Solanaceae	–	7681	Arnahaba (KN)	N26° 54.528, E084° 02.072	Respiratory diseases
S. virginianum L.	Solanaceae	Kantakari	7651	Shahpur (KN)	N26° 54.549, E084° 02.846	Respiratory diseases
			646	Rampur (D)	N26° 34.623, E083° 46.579	
Spondias pinnata (Lf.) Kurz.	Anacardiaceae	Amratak	9754	Rudrapur-Gauri (D)	N26° 30.614, E083° 41.624	Gastrointestinal disorders
Streblus asper Lour.	Moraceae	Shakhotak	7680	Arnahaba (KN)	N26° 54.514, E084° 02.099	Gastrointestinal disorders
			9670	Shawaldas Dham (D)	N26° 19.484, E083° 56.874	
Strychnos nux-vomica L.	Loganiaceae	Kupilu	9665	Shawaldas Dham (D)	N26° 19.517, E083° 56.572	Pain reducer
Syzygium communis (L.) Skeels	Myrtaceae	Shitivarak Jambu	7729	Mahant Patti (KN)	N26° 41.406, E083° 58.759	Gastrointestinal disorders, diabetes
			9726	Jangal Jhukuri (D)	N26° 27.183, E083° 43.053	
S. salycifolium (Wight) J. Grahm	Myrtaceae	Nadi Jambu, Jamun	7714	Madhriya (KN)	N26° 42.208, E083° 59.751	Gastrointestinal disorders, diabetes
Tamarindus indicus L.	Leguminosae	Amlika, Imli	7741	Kolhuwa (KN)	N26° 40.711, E083° 57.765	Gastrointestinal disorders, diabetes
			9751	Jangal Jhukuri (D)	N26° 35.103, E083° 41.944	
Telosma pallida (Roxb.) Craib	Apocynaceae	–	7699	Shahpur (KN)	N26° 54.052, E84° 02.922	Aphrodisiac tonic
Terminalia arjuna (Roxb. Ex DC.) Wight & Argn.	Combretaceae	Arjuna	7683	Arnahaba (KN)	N26° 54.518, E084° 02.023	Cardiac tonic
			9768	Mithawal-II (D)	N26° 19.658, E083° 50.860	
T. tomentosa W. & A.	Combretaceae	Asana	7710	Madhuriya (KN)	N26° 42.379, E083° 59.752	Cardiac tonic
Thespesia lampas (Cav.) Delzell	Malvaceae	Van Karpas	7694	Shahpur (KN)	N26° 54.089, E84° 02.893	Hepatoprotective tonic

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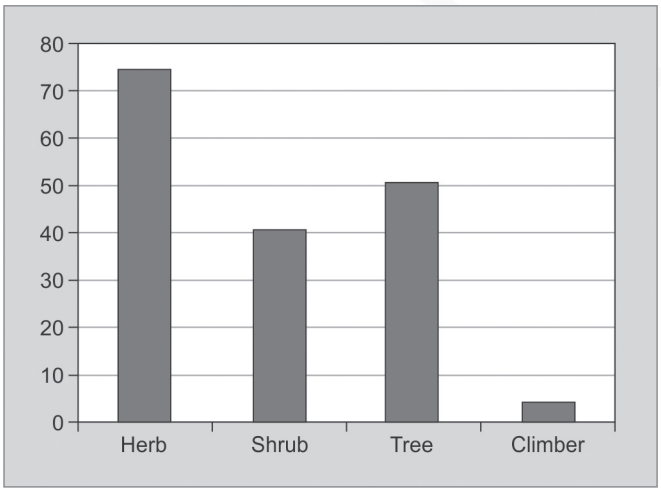
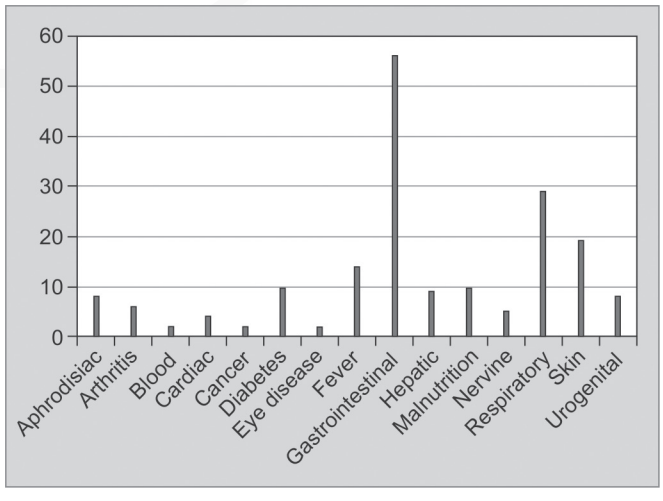
Botanical name and family	*Family*	*Vern. name*	*Collection No.*	*Locality*	*GPS*	*Related disorder*
Tinospora sinensis (Lour.) Merr.	Menispermaceae	Guduchi	7716	Dahripatti (KN)	N26° 41.924, E083° 59.037	Gastrointestinal disorders
			9694	Bhatni Range (D)	N26° 30.281, E083° 47.113	
Trapa natens L.	Lythraceae	Shringatak, Singhara	9756	Laxmipur (D)	N26° 30.297, E083° 38.004	Nutritious
Tribulus terrestris L.	Zygophyllaceae	Gokshuru	9682	Shawaldas Dham (D)	N26° 19.502, E083° 56.577	Urogenital diseases
Trichosanthes dioica Roxb.	Cucurbitaceae	Paeawal	9723	Jangal Jhukuri (D)	N26° 28.659, E083° 41.716	Gastrointestinal disorders
T. tricuspidata Lour.	Cucurbitaceae	Vishala	7663	Shahpur (KN)	N26° 54.515, E084° 02.787	Respiratory diseases, such as asthma
Tridax procumbens (L.) L.	Compositae		9720	Jangal Jhukuri (D)	N26° 28.718, E083° 41.626	Gastrointestinal disorders
Triumfetta rhomboidea Jacq.	Malvaceae	Jhinjhirita	7684		N26° 54.484, E84° 02.032	Aphrodisiac
			9619	Deoria	N26° 34.528, E083° 49.685	
Urena lobata L.	Malvaceae	Vanabhenda	7653	Shahpur (KN)	N26° 54.551, E084° 02.749	Aphrodisiac tonic
			9615	Deoria-Rampur (D)	N26° 34.528, E083° 49.685	
Ventilago madraspatana Gaertn.	Rhamnceae	Kaivartika	9690	Bhatni (D)	N26° 19.502, E083° 56.577	Cancer, skin diseases
Wrightia arborea (Dennst.) Mabb	Apocynaceae	Swet Kutaj	9663	Shawaldas Dham	N26° 19.517, E083° 56.572	Gastrointestinal disorders, such as dysentery
Xanthium strumarium L.	Compositae	Artagal	7685	Arnahaba (KN)	N26° 54.450, E84° 02.039	Malarial fever
			9649	Rampur (D)	N26° 35.460, E083° 46.352	
Zingiber zerumbet (L.) Rosc. ex.Sm.	Zingiberaceae	Karchura	7718	Dahripatti (KN)	N26° 41.908, E083° 59.024	Rheumatism, respiratory diseases
Zizyphus jujuba Mill.	Rhamnaceae	Badari, Kola	9700	Bhatni (D)	N26° 30.281, E083° 47.113	Blood purifier
Z. nummularia (Burm. f.) Wight. & Arn.	Rhamnaceae	Karkandhu, Jharberi	7715	Daharipatti (KN)	N26° 42.208, E083° 59.751	Blood purifier
			9715	Tiwai (D)	N26° 28.792, E083° 41.672	



Graph 1: Bar diagram showing occurrence of herbs, shrubs, trees, and climbers in the study areas



Graph 2: Diagrammatic representation of number of plants used for various diseases

The unused land free from agricultural land needs to be utilized for medicinal plants cultivation. Villagers need to be given appropriate training and support toward conservation of commercially viable medicinal plants available in the field and linking with the traders and pharmaceuticals for utilization of the produce.

Conservation Experience

Experimental experience in Arunachal Pradesh, Assam, Sikkim, Manipur, Nagaland, Meghalaya, and Mizoram of North East India, and Chhattisgarh and Uttarakhand has led to adaption of conservation aspects for selected medicinal plants in different suitable localities. However, Madhya Pradesh and Uttar Pradesh are concentrating on *Mentha piperita* and *Chlorophytum borivilianum*, and occasionally, *Aloe barbadensis* cultivation. Karnataka and Kerala are concentrating on cultivation of medicinal plants with dual uses like *Cinnamomum zeylanica, Elettaria cardamomum,* and *Santalum album*.

A network of conserving about 30 species of medicinal plants has been initiated by the National Medicinal Plants Board out of which *Aegle marmelos, Bacopa monnieri, Emblica officinalis* are being cultivated in Uttar Pradesh. However, a large number of medicinal plants growing in Uttar Pradesh are in great demand by the pharmaceuticals. In the present situation, plants of *Boerhavia diffusa*, *Fumaria indica*, *Ocimum tenuiflorum*, *Solanum virginianum, Tinospora cordifolia* are in great demand. Experience of including other species in the states is gradually increasing. There is no better scope for conservation of medicinal plants in wild under *in situ* conservation; however, only cultivation can be made for few species in the waste land.

Traditional healing practitioners are also very limited in the areas.

Cultivation of medicinal plants is the only criterion for conservation through mixed cropping with agricultural crops, which is not in practice as introduction of timber plants like *Shorea robusta* and *Tectona grandis.* Most of the conservation areas are confined to the teak forests and road sides only. There is a need to motivate farmers toward cultivation practice of medicinal plants in the waste land and agriculture farms only. Cultivation of *Andrographis paniculata, Bacopa monnieri, Celastrus paniculatus, Oroxylum indicum and Strychnos nux-vomica* can be made in the waste land for commercial use of whole plant, root and bark which is done in an unplanned and nonscientific manner.

DISCUSSION

The studied areas are mostly agriculture field except a few patches that are kept reserved; hence, the concept of conservation of medicinal plants in the said areas is having the least scope and cultivation of medicinal plants is the only way to develop sustainability of the medicinal plants in the area. However, 201 species of medicinal plants have been collected and identified from different geographical locations. Cultivation can be made in the waste land and agriculture field only through mixed cropping. Only few traditional healers are practicing the local traditional method of treatment by the use of locally available herbs. This knowledge needs to be exchanged with the folk healers of adjoining areas.

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हिन्दी सारंश

उत्तर प्रदेश के देवरिया तथा कुशीनगर वनखंडों में पाए जाने वाली महत्वपूर्ण वनौषधियों का सर्वेक्षण

उद्देश्यः प्रस्तुत शोधपत्र में उत्तर प्रदेश के देवरिया तथा कुशीनगर दो संलग्न वनखंडों के भेषजशालाओं में उपयोगी औषधीय पौधों का प्रलेखन तैयार करने के उद्देश्य से इनकी प्रचुरता व वितरण का विस्तृत विवरण दिया जा रहा है।

अध्ययन का निष्कर्षः वर्ष 2015 से 2016 के दौरान समीपस्थ वन प्रभागों का अन्वेषण किया गया। अन्वेषण के दौरान फार्मास्यूटिकल रूप से महत्वपूर्ण औषधिय पादपों का जी पी एस एवं उनकी क्षमता का अभिलेखन किया गया। इस क्षेत्र में महत्वपूर्ण औषधीय पादप जैसे बेल, कालमेथ, ब्रह्मी, ज्योतिस्मती, मंड्कपर्णी, शालपर्णी, पिप्पली, काकमाची तथा असन का भी अभिलेखन किया गया।

उपलब्धियांः अध्ययन क्षेत्र के अंतर्गत बेल, कालमेघ, ब्रह्मी, ज्योतिस्मती, मंडूकपर्णी, शालपर्णी, श्योनाक, पिप्पली, काकमाची तथा असन आदि प्रमुख पाये गए हैं जिनका विस्तृत विवरण दिया गया है।

निष्कर्षः अध्ययन के दौरान प्राप्त वनौषधियों को भेषजशालाओं द्वारा इनकी उपलब्धता को ध्यान में रखते हुए प्रयोग करना चाहिए तथा क्षेत्र में कम होती वनौषधियों को भेषजशालाओं की मांग को पूरा करने हेतु उनकी व्यावसायिक रूप से खेती की जा सकती है जिसके साथ कुछ अन्य औषधीय पौधों जैसे घृतकुमारी, सर्पगंधा तथा पृश्निपर्णी को भी कृषिकरण हेतु शामिल किया जा सकता है।

शब्द कुंजीः देवरिया, अन्वेषण, सोलेनम नीग्रम, टर्मिनेलिया टोमेन्टोसा।