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A comprehensive exploration of the floral wealth of Sarkaghat forest range of Mandi District Himachal Pradesh

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Abstract
This study encompasses an investigation into the floral diversity and ethnobotanical insights within the Sarkaghat forest range of Mandi District, Himachal Pradesh. Within this region, a comprehensive botanical survey identified a total of 384 vascular plant species, which are further categorized into Angiosperms (comprising 100 families, 278 genera, and 374 species), Gymnosperms (1 family, 2 genera, and 3 species), and Pteridophytes (5 families, 5 genera, and 7 species). Among this diverse array of species, 71 are classified as trees, 97 as shrubs, 209 as herbs, and 7 as pteridophytes. This abundance underscores the significant biodiversity of the area and emphasizes the ethnobotanical relevance of these plants, particularly in their medicinal applications, which can greatly benefit the local population.

Keywords: Ethnobotany, Sarkaghat, mandi, medicinal plants, flora, forest

Introduction
Plants play an indispensable role within the Earth's biosphere, exerting a profound influence on ecosystem operations and furnishing vital ecosystem services that directly benefit humanity. Our existence, as we understand it, hinges on the presence of plants, which are fundamental resources we depend on for sustenance, water, medicinal remedies, the air we breathe, shelter, climate regulation, and much more. Virtually all living organisms, including humans, rely on plants as a primary source of nourishment. Moreover, plants yield a plethora of products that serve human needs, encompassing firewood, construction materials, textiles, pharmaceuticals, colorants, pest control agents, oils, and rubber [1].

As of now, over 300,000 plant species have been documented and characterized. Nonetheless, botanists project that there remain tens of thousands of plant species awaiting discovery, particularly within underexplored environments like tropical forests. The reliance of humanity on plants, whether directly or indirectly, is profound. Plants furnish essential elements of life, including sustenance, clothing, energy sources, housing, and a multitude of other vital necessities [2].

Over 4,500 years ago, ancient Egyptians crafted the initial form of paper using papyrus, a plant with grass-like qualities. The practice of using plants and their natural compounds for medicinal purposes can be traced back to the dawn of human civilization. In early cultures, healers and physicians often possessed deep knowledge of plants. Remarkably, many of the medicinal plants uncovered by these early societies remain in use even today [2]. To illustrate, Native Americans used to chew willow leaves for pain relief, as these leaves contain salicylic acid, a compound closely related to aspirin. Quinine, derived from the bark of the South American cinchona tree, was a historical remedy for combating malaria. Around 400 BC, the renowned physician Hippocrates compiled a list of over 400 drugs, many of which were derived from herbs and medicinal plants. Astonishingly, about half of these ancient remedies continue to be employed today.

The earliest reference to the medicinal use of plants in Hindu culture can be traced back to the "Rig Veda," an ancient text composed between 4500 and 1600 B.C., considered one of humanity's oldest knowledge repositories [3]. Ayurveda, the cornerstone of Hindu medicinal knowledge, is divided into eight sections, each addressing specific drug properties and various aspects of the science of life and the art of healing.

The earliest recorded evidence of utilizing medicinal plants in drug formulations dates back about 5,000 years, with a Sumerian clay tablet discovered in Nagpur.

This ancient tablet contains 12 recipes for drug preparations involving over 250 different plants, including alkaloid-rich ones like poppy, henbane, and mandrake. Notably, many spice plants that continue to be popular today, such as nutmeg, pepper, and clove, have their origins in India.

Throughout Asia, numerous historical records affirm the therapeutic value of Himalayan herbs. Among these, one of the earliest documented instances of herbal plant use can be traced back to the Vedas, composed around 4500 to 600 B.C., serving as one of the most ancient reservoirs of human wisdom. These texts identify and describe approximately 67 different plant species with medicinal properties [4]. Ayurveda, a well-established traditional medical system embraced in India and Nepal, offers comprehensive insights into the therapeutic application of numerous herbal remedies. Over the past three decades, there has been a notable resurgence of global interest in traditional medicines and plant-derived drugs. Ongoing efforts are dedicated to uncovering potent herbal medicines rooted in the ethno-therapeutic practices prevalent in tribal and aboriginal societies. Ethnobotanical knowledge is of utmost importance in the primary healthcare and economic activities of these populations, holding the potential for the discovery of novel herbal drugs and new sources of nutraceuticals, among other benefits.

The influence of modern human societies on traditional cultures and natural habitats has led to significant losses of individual species and profound disruptions in various species communities, encompassing plants, animals, and fungi. Displaced or scattered communities, who have transmitted generations of observations and traditions orally, lose their languages, the names for things, and their connections within the intricate web of relationships. In some cases, as people migrate, new relationships are formed, giving rise to new or adapted ethnobotanical knowledge.

Floral variety in Himachal Pradesh is categorized into forest vegetation, medicinal and aromatic plants, and the diversity of agricultural crops, including less explored cereal crops, wild fruits, and ornamental plants. Out of the 47,000 plant species existing in the entire country, Himachal Pradesh boasts a remarkable 3,256 reported species within its boundaries [5]. The state's vegetation encompasses a mix of Ban Oak Forest, Moist Temperate Deciduous Forest, Himalayan Alpine Pastures, and Rhododendron Scrub Forest. Coniferous forests are prevalent in the middle and upper hills, with oak trees thriving in lower-lying areas. In the foothills, you'll find dry deciduous forests where Sal stands as the primary species, and in arid regions, chir pine takes dominance. These diverse and lush forests, coupled with the wide range of biodiversity in the state, play a crucial role in sustaining the livelihoods of its residents.

Himachal Pradesh stands as a reservoir of medicinal plants, boasting a wealth of herbal medicinal resources. Many villages in specific areas depend on these medicinal plants for their livelihoods [6]. This paper primarily centers on cataloging medicinal and significant plants within the Sarkaghat Tehsil of Mandi district. Given the absence of an existing compilation for this particular region, this paper stands as a valuable resource for ethnobotanists across various domains.

Material and Methods

Study Area: Sarkaghat is a town, a Nagar Panchayat and a Tehsil in the located in Mandi district of Himachal Pradesh (Figure 1). Sarkaghat is one of the 5 Local Urban Bodies in Mandi District. The town is located about 60 km away from the district headquarters at Mandi. Sarkaghat forest range comes under the Suket forest division of Mandi District. This forest range has a sub-tropical climate and is characterized by hot summers and cold winters. The temperature varies between 10 degrees C to 45 degrees C with June as the hottest and January as the coldest months. Geologically, Sarkaghat town is located in a seismic zone.

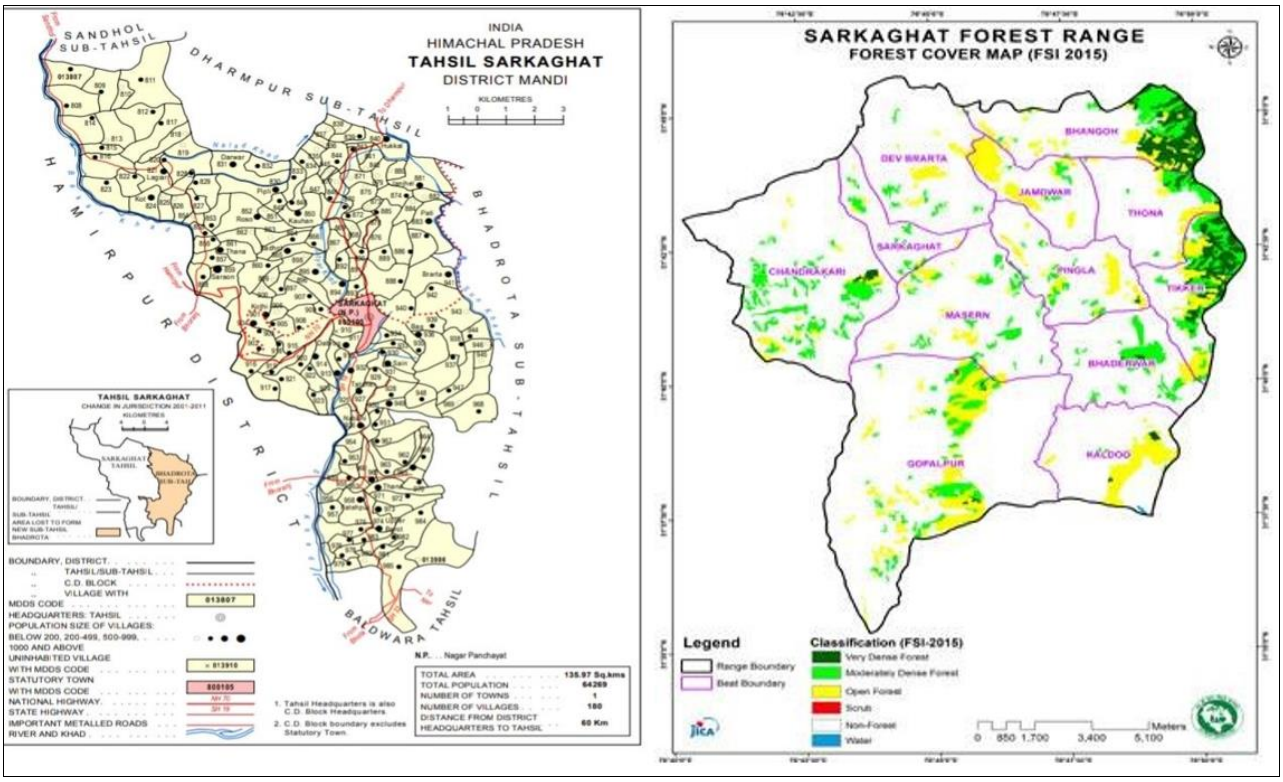

Fig 1: Map showing the area of the collection (Source: Internet)

Methodology

This study relies on secondary data, with the majority of information sourced from the Sarkaghat Forest Range Office. Extensive web-based research was conducted using Google and Google Scholar as primary search platforms. Additional efforts were made to gather information from research papers and review articles published within the last 15 years. Some of the plant species within the study area were assessed for various purposes such as timber, fodder, fuel, resin, gum, tans, dyes, and medicinal and aromatic qualities, drawing on data available in working plans, research papers, and reviews.

Information was cross-referenced from various botanical references, including works such as "Flora Simlensis" by Collett (1902, 1921), "Flora of Lahaul and Spiti" by Aswal and Mehrotra (2009) [7], "Flora of Kullu" by Dhaliwal and Sharma (1999) [8], "Flora of Sirmaur" by Kaur and Sharma (2004) [9], "Flora of Bushahr Himalayas" by Nair (1977) [10], and "Flora of Himachal Pradesh" by Chaudhery and Wadhwa (1984) [11]. Additionally, information was confirmed through references such as Seth and Jaswal (2004) [12], Pullah (2000), Jain (1968 and 2000) [13], Khare (2004) [14], Maheswari (2000) [15], and Rawat and Chowdhury (1998) [16].

Results and Discussion

Forest Type

This forest range (Sarkaghat) comes under the lower Shivalik chir pine forest (Subtype 9/C_{1a}), this sub-type occurs below 1,000m elevation on Shivalik hills [17]. This consists of pure chir pine with *Terminalia chebula*, *Mallotus phillipinenis*, *Pyrus pashia*, *Syzygium cumini*, *Albizia chinensis*, etc. The total area of the Sarkaghat forest range is 2545.2514 hectares. Deodar and Banalso occur in this forest range in the Chobra (C-2) and Kaldoo forests. 34 forests come under this forest range (Table 2).

Table 1: Area wise breakup of the forest land legal classification

Forest Type	Area in hectare
Reserve forest	Nil
Protective forest	2330.73
Undemaracted Forest	195.24.49
4Rutta grass land	19.26.65

Table 2: List of 34 forests that come under Sarkaghat Forest Range

Name of Forest Block	Name of Beat	New DPF	Old DPF	Compartment/ Whole	Area in hectare
Sarkaghat	Sarkaghat	Jhinjroo I	-	Whole	31.94
		Jhinjroo II	-	Whole	19.50
		Dev-Bradta	-	Whole	10.87
		Ropri		Whole	5.6
	Chandarkari		Chandarkari	C-1	26.45
			-	C-2	9.56
			-	C-3	22.12
					58.13
		Shih Nal	-	Whole	4.33
	Gopalpur	Barong	-	C-1	58.47
			-	C-2	94.72
					153.19
		Bid	-	Whole	5.50
		Chandesh	-	Whole	2.29
		Tapon	-	Whole	34.34
		Parnoh	-	Whole	4.88
	Bhangoh	Bhangoh	-	C-1	74.36
			-	C-2	43.23
			-	C-3	57.7
			-	C-4	16.51
					191.17
	Maseran	Batalri	-	Whole	4.31
		Sarohli I	-	Whole	9.31
		Sarohli II	-	Whole	7.1
		Doon silh	-	Whole	18.17
		Bahlra Check	-	Whole	7.8
		Hawani	-	Whole	9.47
		Bhalyana	-	Whole	7.77
Durgapur	Kaldoo		Kaldoo	C-1	177.43
			-	C-2	55.13
			-	C-3	46.81
			-	C-4	27.5
			-	C-5	54.39
					360.81
		Shil	-	Whole	23.85
		ChambaNal I	-	Whole	9.59
		II	-	Whole	13.43
	Bhaderwar	Thathal	-	C-1	92.65
			-	C-2	84.93
					177.58
	Pingla	Baira Dhar	-	Whole	26.32
		Sandoh	-	Whole	9.12
Thona	Jamdwar	Jamdwar I	-	Whole	96.43
		Jamdwar II	-	Whole	22.9

		Kalash	-	Whole	37.7
		Ghamdol	-	Whole	11.66
	Thona	Kholtu	-	Whole	29.14
		Muroh Dhar	-	C-1	51.24
			-	C-2	39.71
			-	C-3	192.78
					283.73
	Tikker	Behli Dhar	-	Whole	47.14
		Chobhra	-	C-1	23
			-	C-2	49.44
					72.44
		Tikker	-	Whole	122.46
		Jhum Dhar	-	C-1	195.71
			-	C-2	207.84
					403.55

Source: Data collected from Sarkaghat Forest Range Office

Common Flora and Fauna

Common fauna: This range includes goral (*Genus Naemorhedus*), barking deer (*Muntiacus muntjac*), koklas (*Pucrasia macrolopha*), red jungle fowl (*Gallus gallus domesticus*), peacock (*Pavo cristatus*), rabbit (*Oryctolagus cuniculus*) etc.

Flora: A large number of useful trees that are sources of fodder, mulch, firewood and timber are found in this forest range. The more prominent trees of this district are Simbal (*Bombax ceiba*), tooni (*Toona ciliata*), *toot* (*Morus Alba*), *beul* (*Grewia optiva*), *chir pine* (*Pinus roxburghii*), *Kainth (Pyrus pashia*), *Khirak* (*Celtis australis*), Aam (*Mangifera indica*), Shisham (*Dalbergia sissoo*), Ambala (*Phyllanthus emblica*), Amrood (*Psidium gujava*), etc. The common fruit trees are banana, ber, jamun, mango, pears and mulberry. The wasteland is covered with thorny shrubs. Shruby species show higher frequencies of up to 75% such as Kashamle (Berberis aristata), Basutti (Adhatoda vasica), gandhelu (*Murraya koenigii*) and Bana (*Vitex negundo*).

Experimental Results

Table 3: List of Tree found in Sarkaghat Forest Range

S. No.	Botanical Name	Family Name	Local Name
1.	*Aegle marmelos*	Rutaceae	Bael
2.	*Acacia sinuata*	Fabaceae	Shikakai
3.	*Acacia katechu*	Fabaceae	khair
4.	*Albizia procera*	Fabaceae	Safed siris
5.	*Albizzia chinensis*	Fabaceae	Oie
6.	*Aresia indica*	-	Gawaun
7.	*Bauhinia verigata*	Fabaceae	Kachnaar
8.	*Betula utilis*	Betulaceae	Bhojpatra
9.	*Bombax ceiba*	Bombaceae	Simbal
10.	*Cassia fistula*	Ceasalpiniaceae	Amaltas
11.	*Catunaregam spinosa*	Rubiaceae	Kango
12.	*Cedrus deodara*	Pinaceae	Devdar
13.	*Celtis australis*	Cannabaceae	Khidak
14.	*Citrus limonis*	Rutaceae	Nimbu
15.	*Cordia dichotoma*	Boraginaceae	Lasora
16.	*Dalbergia sissoo*	Fabaceae	Shisham
17.	*Eucalyptus spp.*	Myrtaceae	Safeda
18.	*Falconeria insignis*	Euphorbiaceae	Balodhar
19.	*Ficus bengalensis*	Moraceae	Bargad, banyan tree
20.	*Ficus carica*	Moraceae	Khasra
21.	*Ficus auriculata*	Moraceae	Trayamblu
22.	*Ficus hispida*	Moraceae	Fegra
23.	*Ficus religiosa*	Moraceae	Peepal
24.	*Grewia optiva*	Tiliaceae	Bahyul
25.	*Juglans regia*	Juglandaceae	Walnut, akhrot
26.	*Mangifera indica*	Anacardiaceae	Aam, mango
27.	*Mallotus phillipinenis*	Euphorbiaceae	Kamala
28.	*Morus alba*	Moraceae	Toot
29.	*Myrica esculenta*	Myricaceae	Kaphal
30.	*Pinus roxburghii*	Pinaceae	Chir pine
31.	*Pistacia integerrima*	Anacardiaceae	Kakde
32.	*Prunus cerasoides*	Rosaceae	Pajja
33.	*Prunus persica*	Rosaceae	Aadu
34.	*Phyllanthus emblica*	Combretaceae	Amla
35.	*Pyrus pashia*	Rosaceae	Kainth

36.	*Quercus leucotrichophora*	Fagaceae	Ban oak
37.	*Rhododendron arboreum*	Ericaceae	Burans, burrahe
38.	*Ricinus communis*	Euphorbiaceae	Arand
39.	*Salix acmophylla*	Salicaceae	Bada, Brook willow
40.	*Sapindus mukorossi*	Sapindaceae	Reetha
41.	*Spondias pinnata*	Anacardiaceae	Ambara
42.	*Syzygium cumini*	Myrtaceae	Jamun
43.	*Terminalia bellerica*	Combretaceae	Bheda
44.	*Terminalia arjuna*	Combretaceae	Arjun
45.	*Terminalia chebula*	Combretaceae	Harad
46.	*Toona ciliata*	Meliaceae	Tuni
47.	*Wendlandia heynei*	Rubiaceae	*Pansira*
48.	*Zanthoxylum armatum*	Rutaceae	Tirmer

Table 4: List of Shrubs found in Sarkaghat Forest Range

S. No.	Botanical Name	Family Name	Vernacular Name
1.	*Adhatoda vasica*	Acanthaceae	Basutti
2.	*Ajuga bracteosa*	Lamiaceae	Neelkanthi
3.	*Berberis aristata*	Berberidaceae	Kashamle
4.	*Calotropis procera*	Asclepiadaceae	Aak
5.	*Carissa carandus*	Apocynaceae	Karonda
6.	*Dodonaea viscosa*	Sapindaceae	Mehndu
7.	*Elaeagnus conferta*	Elaegnaceae	Wild olive
8.	*Holarrhea pubescens*	Apocynaceae	Inderaju
9.	*Impatiens balsamina*	Balsaminaceae	Tayur
10.	*Indigofera hamiltonii*	Fabaceae	Araal
11.	*Jasminum pubescens*	Oleaceae	Ban Malti, Jasmin
12.	*Lantana camera*	Verbenaceae	Phoollakri
13.	*Murraya koenigii*	Rutaceae	Ghandelu, curry pata
14.	*Rosa moschata*	Rosaceae	Ban gulab
15.	*Rubus ellipticus*	Rosaceae	Aakhe, Golden Himalayan raspberry
16.	*Salix hastate*	Salicaceae	Beuns
17.	*Sida cordifolia*	Malvaceae	Bal
18.	*Vitex negundo*	Lamiaceae	Banna
19.	*Woodfordia fruticosa*	Lythraceae	Dhai
20.	*Ziziphus nummularia*	Rhamnaceae	Jangli ber

Table 5: List of Herbs found in Sarkaghat Forest Range

S. No.	Botanical Name	Family Name	Local Name
1.	*Achyranthes aspera*	Acanthaceae	Poothkanda
2.	*Acmella oleracea*	Asteraceae	Akarkara
3.	*Acorus calamus*	Acoraceae	Barya
4.	*Agave americana*	Agavaceae	Chub
5.	*Ageratum conyzoidies*	Asteraceae	Ujadu, neela phulnu
6.	*Ajuga bracteosa*	Lamiaceae	Benth
7.	*Aloe vera*	Liliacea	Ghrit kumari
8.	*Amaranthus viridis*	Amaranthaceae	Chaulai
9.	*Argemone mexicana*	Papaveraceae	Satayanashi
10.	*Asparagus adscents*	Liliaceae	Shatavari
11.	*Avena sativa*	Poaceae	Joi
12.	*Barleria cristata*	Acanthaceae	Dantkanti
13.	*Bidens Pilosa*	Asteraceae	Black jack, gumar
14.	*Cannabis sativa*	Cannabaceae	Bhang
15.	*Catharanthus roseus*	Apocynaceae	Sadabhar
16.	*Centella asiatica*	Apiaceae	Brahmi butti
17.	*Centepeda minima*	Asteraceae	Nakhchikdu
18.	*Curcuma longa*	Zingiberaceae	Haldre
19.	*Datura metel*	Solanaceae	Dhatura
20.	*Euphorbia helioscopia*	Euphorbiaceae	Dudhi
21.	*Fagopyrum dibotrys*	Polygonaceae	Perennial buckwheat, ban ogal
22.	*Hemidesmus indicus*	Apocynaceae	Dudhali
23.	*Mentha spicata*	Lamiaceae	Pudina
24.	*Ocimum bascilicum*	Lamiaceae	Bhabhari
25.	*Ocimum sanctum*	Lamiaceae	Tulsi

26.	*Potentilla indica*	Rosacea	Mock-strawberry
27.	*Rumex acetosella*	Polygynaceae	Khatti-meethi
28.	*Seasamum orientale*	Pedaliaceae	Til
29.	*Thymus linearis*	Lamiaceae	Jangali ajwain
30.	*Trifolium alexandrium*	Fabaceae	Basrin
31.	*Urtica dioica*	Urticaceae	Bichu buti
32.	*Vernonia anthelmintica*	Asteraceae	Brahmjiri
33.	*Viola serpens*	Violaceae	Banafsha

Table 6: List of Climbers found in Sarkaghat Forest Range

S. No.	Botanical Name	Family Name	Vernacular Name
1.	*Abrus precatorius* L.	Fabaceae	Rati
2.	*Basella alba* L.	Chenopodiaceae	Poi
3.	*Bauhinia vahlii*.	Fabaceae	Taur
4.	*Celastrus paniculatus* Willd.	Celastraceae	Sankheeru
5.	*Cissampelos parriera* L.	Menispermaceae	Bhatindu
6.	*Clematis gouriana*	Ranunculaceae	Gudbel
7.	*Cuscuta reflexa*	Convolvulaceae	Akashbel
8.	*Dioscorea bellophylla* Voight	Dioscoreaceae	Tardi
9.	*Dioscorea bulbifera* L.	Dioscoreaceae	Gangardi
10.	*Dioscorea oppositifolia* L.	Dioscoreaceae	Dregal
11.	*Ipomoea turbinata* Lag.	Convolvulaceae	Ghondali
12.	*Luffa acutangula* (L.) Roxb.	Cucurbitaceae	Jangli-Gangher
13.	*Mucuna pruriens* (L.) DC.	Fabaceae	Draugal
14.	*Stephaniaglabra* (Roxb.) Miers	Menispermaceae	Bish-Khapar
15.	*Tinospora cordifolia* Miers	Menispermaceae	Gulja
16.	*Vitis rependa*	Vitaceae	Maraingu

Table 6: List of Pteridophytes found in Sarkaghat Forest Range

S. No.	Botanical Name	Family Name	Vernacular Name
1.	*Adiantum capillusveneris*	Pteridaceae	Maidenhair Fern, Southern Maidenhair Fern, Hanspadi
2.	*Adiantum caudatum*	Pteridaceae	Walking Maidenhair fern, Trailing maidenhair Peacock's Tail, Mayurashikhaa, Sahastrahi, Neelkantha shikhaa
3.	*Adiantum incisum*	Pteridaceae	Maiden Hair Fern, Trailing maiden hair fern, Nilakantha-shikhaa, Mayurshikhaa Hansraj, rajahans, Vahrishikha, Adhsaritakajhari
4.	*Adiantum philippens*	Pteridaceae	Black maidenhair, Hamsapadi,Hanswati
5.	*Adiantum venustum*	Pteridaceae	Himalayan maidenhair, evergreen maidenhair fern
6.	*Asplenium dalhousiae*	Aspleniaceae	Spleen wort
7.	*Aspleniumtricomanes*	Aspleniaceae	Maidenhair spleenwort, Bird 's nest fern
8.	*Athyrium attenuatum*	Athyriaceae	-
9.	*Cheilanthesalbomarginata* Clarke (CA)	Pteridaceae	Lip fern
10.	*Cheilanthesbicolor (Roxb.in Griff.)*	Pteridaceae	Kali Sanka, silver fern
11.	*Diplazium esculentum* (Retz.) Sw.	Athyriaceae	Lingde, Lingri, Lingdu
12.	*Dryopteris cochleata*	Dryopteridaceae	Wood fern, buckler fern
13.	*Marsilea minuta* Linn.	Marsileaceae	Dwarf water clover, gelid waterklawer, mall water clover, airy pepperwort
14.	*Onychium japonic um*	Pteridaceae	Carrot fern
15.	*Pteris cretica*	Pteridaceae	Cretan Brake, Cretan Fern, Ribbon Fern, Table Fern
16.	*Pteris vittata* L	Pteridaceae	Brake fern
17.	*Selaginella chrysocaulos*	Selaginellaceae	Kungoo
18.	*Woodwardia unigemmata*	Blechnaceae	Jeweled chain fern

Table 6: List of Important Timber Tree species found in Sarkaghat Forest Range

S. No.	Botanical Name	Family Name	Local Name	Locality
1.	*Bombax ceiba*	Bombaceae	Simbal	Ropri
2.	*Cedrus deodara*	Pinaceae	Devdar	Chobhra
3.	*Pinus roxburghii*	Pinaceae	Chir pine	Hawani
4.	*Pyrus pashia*	Rosaceae	Kainth	Sandoh
5.	*Quercus leucotrichophora*	Fagaceae	Ban oak	Kaldoo
6.	*Toona ciliata*	Meliaceae	Tuni	Bhanogh
7.	*Albizia chinensis*	Fabaceae	Oie	Dev- Brarta
8.	*Dalbergia sissoo*	Fabaceae	Shisham	Hawani

Table 7: Ethnobotanically important plant species found in Sarkaghat Forest Range

Sr. No	Botanical Name	Common Name	Part used (D-Dried, F-Fresh)	Local Uses
1.	*Achyranthes aspera* L.	Poothkanda	Leaves, Roots (F)	Infusion of leaves is given to strengthen the stomach usually assists on expelling gases and flatulence. Roots are chewed in toothache and are used to cure pyorrhea.
2.	*Adhatoda zeylanica*	Basuti	Flower, leaves, roots(D)	The dry flower powered and mixed with honey which is useful for asthma and bronchitis. Roots and leaves are also used as mosquito repellent.
3.	*Aerides multiflora*	Bhangru	Leaves (D)	Leaves are shade dried and ground to fine powder. This powder is deep fried and mixed with sugar and water to obtain a sweet paste. Consumed as general tonic and thought to act as blood purifier.
4.	*Aegle marmelos*	Bel-Ptri	Leaves, fruits (F)	Leaves are used as a mild laxative, for fever. The extract of ripe fruit with water is given for chronic constipation, discomfort or pain.
5.	*Aloe vera*	Ghrit Kumari	Leaves (F)	Leaf juice mixed with ginger juice is used to cure indigestion and jaundice. Leaf juice applied externally, is soothing in cases of burns and wounds cuts.
6.	*Berberis aristata*	Kashmali	Fruits, roots (F)	Ripe fruits are edible and given as a mild laxative. Root extract is taken during diarrhoea and fever.
7.	*Cannabis sativa* L.	Bhang	Leaves, inflorescence (F)	Plant inflorescence yields charas and ganza which in action are sedative, narcotic and toxic. Paste from ground fresh leaves also used as antidote for wasp bites.
8.	*Cassia fistula*	Alhi	Fruits (F)	Fruit pulp is used as laxative during indigestion and stomach pains. Fruits are also given to cattle for better digestion.
9.	*Catharanthus roseus*	Sadabhar	Leaves (D)	The dry leaves are powdered and is used for long time for the treatment of diabetes.
10.	*Centella asiatica*	Brahmi buti	Leaves (D, F)	Leaf extract is used as hair vitalizes. Herb is dried and powder taken with milk during night for brain stimulation.
11.	*Cuscuta reflexa*	Akashbel	Whole plant (F)	The plant is boiled with onion and mint, the extract is used to remove intestinal worms in children.
12.	*Cynodon dactylon*	Doobgrass	Shoot	The grass shoots are used for sprinkling holy water during pooja. The juice of the plant is used to check nose bleeding, called *nathar* or *nakseer.*
13.	*Dioscorea deltoidea*	Tarari	Rhizome (F)	Rhizome yield a steroid used in rheumatic diseases and ophthalmic disorders
14.	*Phyllanthus emblica*	Amla	Fruits (D, F)	Dry fruits are powdered which is used to cure intestinal disorder and indigestion.
15.	*Hemidesmus indicus*	Dudhali	Roots, leaves (D, F)	Dry leaves are powdered and inhaled to clear respiratory path. The leaves are grinded to make a bolus, given orally to cattle for 3 days to cure convulsive seizures.
16.	*Mentha spicata* L.	Pudina	Leaves (F)	The consumption of mint leaves helps to cure spasm, relieves flatulence and pains from the stomach and bowels.
17.	*Murraya koenigii*	Gandhela	Stem, flower (F)	Stem is used as tooth brush. The flowers are useful in digestion.
18.	*Psidium guajava*	Amrood	Fruits, leaves (F)	Leaves are chewed to cure cough and minor throat problems. Young fruits with castor oil are given to cattle to get relief from constipation.
19.	*Ricinus communis*	Arand	Seed (F)	Seed oil is used as an ointment for joint pains.
20.	*Rumex nepalensis* Sprengel.	Khat marora	Leaves, stem (F)	Crushed leaves are applied on cuts, wounds and other skin irritations.
21.	*Sida cordifolia* L.	Bal	Whole plant, fruits (F)	The plant infusion is applied on bleeding piles. Fruits are eaten to get relief from cough.
22.	*Terminalia bellerica*	Bhera	Fruits (D)	Dried fruits are powdered and used in cough and other throat disorders.
23.	*Thalictrum foliolosum*	Mamira	Leaves, Roots (F)	Leaves are crushed and the juice is applied to cure pimples. Roots extract is used in eye troubles.
24.	*Tinospora cordifolia* Willd.	Giloy	Stem and intact bark (F)	The stem cut into small pieces and then boiled in water and the resultant water is useful against all kinds of fever and urinary diseases.
25.	*Urtica dioica* L.	Bicchu Buti	Whole plant (F)	Plant is used to treat the paralysis by putting them on affected parts. Crushed roots are applied on cuts and wounds.
26.	*Viola serpens*	Banafsha	Flowers (D)	The tea containing flowers of this plant is used against cough and cold.
27.	*Vitex negundo* L.	Banha	Leaves, stem, bark (D, F)	The infusion of the leaves is helpful in expelling worms from body. A pillow stuffed with the leaves of this plant is placed under head to relieve headache. Decoction of leaves and bark are used for toothache, eye diseases, as a tonic and as a vermifuge.
28.	*Woodfordia fruticosa*	Dhai	Bark, flower (D)	The decoction of bark is useful in expelling worms from the body, for dysentery, leprosy and subcutaneous skin diseases. The dry powdered flowers are mixed with honey and administered to check dysentery and diarrhea.
29.	*Zanthoxylum armatum*	Tirmer	Stem, fruits (D, F)	Stem used as a toothbrush to cure teeth disorders. Fruits are powdered and mixed with black pepper and used against tooth decay.

Table 8: Important medicinal and aromatic plants found in Sarkaghat Forest Range

Sr. No	Botanical Name	Common Name	Part used	Local Uses
1.	*Acorus calamus*	Barya	Roots, Leaves	Decoction is prepared by boiling nearly about 200gram roots in water with one teaspoon of sugar. One glass of this decoction is taken empty stomach daily early in the morning for one week to cure indigestion. Juice of fresh leaves to cure skin infection.
2.	*Adhatoda vasica*	Basutti	Leaves	Fresh/dried leaves are boiled in water and filtered. The extract is taken in small doses 2-3 times a day. The leaves of this plant are also utilized as green manure.
3.	*Ajuga bracteosa*	Benth.	Leaves	The leaves are bitter in taste. Firstly, leave washed with water and make the decoction by boiling 250g leaves in 2-liter water. Near about 1 small cup of decoction is taken once a day. Leaves are also used to kill lice, regarded as depurative.
4.	*Asparagus officinalis*	Shatavari	Roots, Whole plant	Dried roots are powdered and taken orally with milk at night time to increase lactation in females. The whole plant is also used in Hindu Marriages and Hawan ceremonies.
5.	*Berberis aristata*	Kashamle	Roots	Roots are boiled in water, strained and evaporated till a semi-solid mass is obtained; this is called 'Rasault', Rasault mixed with butter and alum, or with opium and lime juice is applied externally on eyelids to cure ophthalmia.
6.	*Bombax ceiba*	Simbal	Bark	Paste of the fresh bark is used to cure any wound infection.
7.	*Catharanthus roseus*	Sadabhar	Leaves, Flowers	The decoction is prepared by boiling of near about 500g of leaves in one litter of water. One glass of decoction is taken once a day help to cure stomach cramps. Decoction of flowers used for asthma. Besides the juice of fresh leaves is used for bee stings.
8.	*Cannabis sativa*	Bhang	Leaves, Flower	Dry leaves are powdered and taken orally once a day to cure dysentery and dry leaf paste is applied on the skin to reduce dryness and any type of fungal infection.
9.	*Cassia fistula*	Amaltas	Flower, Leaves	Dried leaves and flowers are powdered and taken orally at the morning with warm water to cure dysentery.
10.	*Cedrus deodara*	Deodara	Bark	The bark of the plant is crushed with mustard oil to make a paste. The paste is applied to the infected area of foot of the animals. The paste should not be kept for more than 10 min and is applied only once a day for 2 days. Dried needles are also used as fuel and stifling of pillows
11.	*Cuscutareflexa*	Amarbel	Whole Plant	The whole plant is boiled in water and filtered then fomentation of this water for 1 hour at night.
12.	*Cynodon dactylon*	Drub	Leaves	Young leaves are used in all the religious ceremonies of Hindus. They also offered to Lord Ganesha.
13.	*Ocimum sanctum*	Tulsi	Whole Plant	Decoction of leaves is prepared, concentrated, allowed to cool and taken twice a day to cure fever. Local people grow tulsi as a religious plant and worship it. Its leaves are used in temples for worship purposes and also on several occasions such as marriage, the birth of a child, etc.
14.	*Terminalia Bellerica*	Bheda	Fruits	Dried fruits are powdered and taken orally to cure Indigestion.
15.	*Urtica dioica*	Bichu booti	Leaves	Young leaves are taken as vegetables.
16.	*Vitex negundo*	Bana	Leaves	Fresh/dried leaves are boiled in water and filtered. The extract is taken in small doses.
17.	*Ziziphus jujuba*	Jungle Ber	Fruits	Dried fruits are powdered and taken orally to cure colds and coughs.

Table 9: Number of families Genera and species documented in the study area

Taxa	Families	Genera	Species	Herbs	Shrubs	Trees
Angiosperms	100	278	374	209	97	68
Gymnosperms	1	2	3	-	-	3
Pteridophytes	5	5	7	7	-	-
Total	106	285	384	216	97	7

Conclusion

Sarkaghat covers an area of 146.40 km², with the Sarkaghat forest range encompassing 2545.2514 hectares. Within the Sarkaghat forest range, a comprehensive survey identified a total of 384 vascular plant species, classified into Angiosperms (100 families, 278 genera, and 374 species), Gymnosperms (1 family, 2 genera, and 3 species), and Pteridophytes (5 families, 5 genera, and 7 species). This diversity is evident in the presence of 71 tree species, 97 shrubs, 209 herbs, and 7 pteridophytes, highlighting the rich biodiversity in this area [18].

It is crucial to establish an effective system for monitoring the extraction and export of medicinal herbs from the forest. Preserving indigenous knowledge about local plant diversity and their applications in primary healthcare is essential to ensure that this knowledge is passed down to future generations. This knowledge is not only valuable for its traditional insights but also plays a significant role in safeguarding local plants with medicinal significance.

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