MS.ID-IJPBS-8321
International Journal of Pharmacy and Biological Sciences-IJPBS™ (2025) 15 (2): 62-90
Online ISSN: 2230-7605, Print ISSN: 2321-3272
Review Article | Biological Sciences | OA Journal | MCI Approved | Index Copernicus

Unveiling The Medicinal Wealth of Sanjay Van, New Delhi

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Received: 26 Jan 2025 / Accepted: 20 Mar 2025/ Published Online: 01 April 2025
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Abstract

The Delhi Ridge, part of the ancient Aravallis, are vital to Delhi's floristic diversity, housing many wild plant species. Sanjay Van, spanning 784 acres within the southern Delhi Ridge, plays a crucial role in preserving the city's green spaces and ecosystem. Approximately 65% of India's population relies on traditional medicine, using indigenous knowledge to diagnose and treat various diseases. Managed by the Horticulture Department, Sanjay Van hosts a diverse range of medicinal plants, such as *Cassia fistula* Linn. *(Amaltas), Pongamia pinnata* Pierre *(Karanj/Papdi), and Azadirachta indica* A. Juss *(Neem),* among others. Therefore, it is essential to visit and document the area's floral diversity for the benefit of the wider community, including students, educators, and researchers. The paper encompasses 33 medicinal plant species across 21 families available in Sanjay Van and highlights their current status and significance, focusing on their chemical constituents, pharmacological actions such as analgesic, antipyretic, anti-inflammatory, hypoglycemic, hepatoprotective, anthelmintic, expectorant, and antioxidant properties and recent researches. With 80% of the global population relying on plant-based medicines and a shift towards herbal remedies in India, it's vital to preserve traditional knowledge, research medicinal plants, and ensure evidence-based healthcare.

Keywords

Sanjay van, Delhi Flora, Medicinal plant, Delhi medicinal plants.

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INTRODUCTION

Floristic diversity of a habitat contains wild species and genetic variation useful in the development of agriculture, medicines and industry [i]. Delhi ridge, an extension of Aravallis which is the oldest mountain chain in India and Yamuna River and its bank are very important part of Delhi flora. Delhi ridge and Yamuna River banks are home of many wild plant species of flora of Delhi. Sanjay Van, covering approximately 784 acres, is part of the expansive southern ridge and plays a crucial role in Delhi's ecosystem. It was established to preserve Delhi's diminishing green areas.

Today about 65% of Indian population depend on the traditional system of medicine They diagnose and cure different diseases through their own traditional knowledge.[ii] Sanjay Van, a forest managed by the Horticulture Department, have a rich repository of medicinal and other useful plants like *Aralu (Aerva lanata* Juss*), Ingudi (Balanites aegyptiaca* (Linn.) Delile*), Patalgarudi (Cocculus hirsutus* Linn. Diels*), Desi Keekar (Acacia nilotica* (L.) Delile*), Khadir (Acacia catechu* willd.*), Khejdi/Jhand (Prosopis cineraria* Druce.*), Amaltas (Cassia fistula* Linn*), Karanj/Papdi (Pongamia pinnata* Pierre*), and Neem (Azadirachta indica* A. Juss*). The area also has thorny bushes such as Hinsra (Capparis sepiaria* Linn*), Karmard (Carissa carandas* L.*), and Saraiyak (Barleria prionitis* Linn*)* etc. This forest, part of the Mehrauli south central ridge, has recently faced severe

degradation due to the proliferation of the Prosopis juliflora tree, which is not native to the Aravalli Ranges. This invasive species has depleted groundwater levels, killed native flora, and altered the natural soil characteristics of the area.[iii] As there is no dedicated documentation on the medicinal plants species of the Sanjay Van, undertaking a tour and recording the particular aspect of the region's floral diversity would be advantageous to the general public, students, educators, industries, and the scientific community.

Aims:

1. Collection and identification of some important medicinal plants found in Sanjay Van Forest, Delhi.
2. Preparation and authentication of herbarium specimens by relevant authorities.
3. Collection and documentation of recent information about botanical names, part used, chemical constituents, pharmacological activities and recent researches conducted on available plant species from different literature sources.

MATERIAL AND METHODOLOGY

Site Description

Sanjay Van is a vast urban forest located in South Delhi (28.5178° N Latitude; 77.1910° E Longitude) India.[iv] It spans approximately 784 acres and is part of the South-Central Ridge, an extension of the ancient Aravalli range, which is one of the oldest mountain ranges in India. Sanjay Van is located adjacent to the iconic Qutub Minar and is encircled clockwise by the Qutub Institutional Area, Aurobindo Marg, Mehrauli-Kishangarh, and Aruna Asaf Ali Marg.[v] It is situated at an average elevation of approximately 246 meters (722 feet) above sea level. However, the elevation within the forest may vary slightly depending on the specific terrain features and topography.[vi]

Field Visit

On February 7th, 2024, an extensive field visit was conducted by the faculty members and PG Scholars of the Dravya Guna Department (Ayurvedic and Unani Tibbia College and All India Institute of Ayurveda) along with Arun Kumar (Botanist), under the expert guidance of Dr Gajendra Rao, to study various natural plant species growing in the forest. During this visit, effort was made to explore every nook and corner of the forest to locate plant species. The identification of plant species based on their characteristic features was carried out. The plant specimens were collected and pressed between blotting paper to remove moisture, and then herbarium sheets were prepared. Information regarding their botanical names, part used, chemical constituents, pharmacological activities and recent researches conducted on available plant species was gathered from Ayurvedic literature, research papers downloaded from PubMed and Google scholar. After compiling the complete information, the data was analysed, and documented in this report.

Observation

This report is a systemic enumeration which documents 33 medicinal plant species arranged in the alphabetical order of their botanical names along with their corresponding Families and Sanskrit names. Besides it also provides information on their useful parts, chemical constituents, pharmacological activities and recent researches conducted based on available literature in the below table 1 and table 2.

Discussion

Various medicinal plant species were identified and studied during this visit, out of which 33 plant species were documented according to Ayurvedic literature for their significant medicinal properties. Of these, the majority-6 species-belong to the Fabaceae family, 3 species to the Malvaceae family, 2 species each to the Rutaceae and Acanthaceae families, and 1 species each to the Apocynaceae, Asteraceae, Balanitaceae, Combretaceae, Convolvulaceae, Capparidaceae, Euphorbiaceae, Gramineae, Meliaceae, Menispermaceae, Moraceae, Myrtaceae, Pandanaceae, Putranjivaceae, Rubiaceae, Salvadoraceae, and Ulmaceae families. Among the reported medicinal plant species, 16 were trees, 10 were shrubs, 5 were herbs, and 2 were climbers.

CONCLUSION

During the field visit, 33 medicinal plant species across 21 families were documented, all of which are utilized for medicinal purposes. These medicinal plants exhibit a wide range of pharmacological activities, including analgesic (12 species), antipyretic (5 species), anti-inflammatory (3 species), hypoglycemic (4 species), hepatoprotective (3 species), anthelmintic (9 species), expectorant (6 species), and antioxidant (5 species). Additionally, these plants were also found to demonstrate various other pharmacological properties such as antimicrobial, anti-cancer, styptic, hemostatic, digestive, blood purifying, hypolipidemic, anti-tubercular, anti-bacterial, bronchodilator, diuretic, vermifuge, anti-fungal, purgative and cardiotonic. The World Health Organization (WHO) reports that 80% of the global population continues to rely on plant-based medicines. India, with its rich and diverse flora, being home to Ayurveda, a traditional system of medicine offers a wealth of knowledge

about medicinal plants. Due to the recent ban by the Indian government on approximately 156 fixed-dose combination (FDC) drugs for potential health risks, there has been a growing shift towards herbal remedies as people seek alternatives to modern medicines, which often have side effects.With the growing interest in herbal remedies and concerns over the side effects of modern medicines, it's crucial to explore and preserve India's medicinal plant resources. Documenting and passing down this traditional knowledge to future generations is essential. Additionally, further research on these plants is needed to improve healthcare and enhance human well-being.

Table1. Medicinal Plant species documented during the visit.

Sr. no	Botanical Name/ Sanskrit Name/ Common Name/ Family	Habit/ Part Used	Chemical Constituent	Karma (Therapeutic actions)	Pharmac-ological Activity	Recent Research
1.	*Acacia arabica* Willd.[vii] *Babbul* *Kikar* Fabaceae	Tree Root, leaves, pods, and bar	Bark yielded Catechin, Epicatechin, Quercitin, Gallic acid, Leucocyanidin gallate and Tannin. Gum contains Galactose, L-rhamnose & L-arabinose.	*Grahi*, *Krimighna, Kaphaghna*, *Kushtaghna*, and *Vishaghna*.[viii]	Analgesic, Styptic, Anti-microbial Hypoglycaemic Anti-cancer	In an in-vitro experiment, the polymeric component of aqueous extracts of gum acacia was found to have hemostatic properties and hasten blood coagulation by shortening of activated partial thromboplastin time and prothrombin time and were non-cytotoxic in nature. It also showed antibacterial activity against organisms known to be involved in wound infections with MIC ranging from 500-600 µg mL for GA thus showing it's utility in wound management.[ix]
2	*Acacia catechu* willd.[x] *Khadir*	Tree Bark, Stem,	10% of acacatechin, quercitin, gum quercitrin	*Ruchivardhaka*, *Dantdardhyakar*, *Kasaghna Medoghna,*	Haemostatic Digestant Anti-microbial Astringent Blood purifier	Methanolic extract of this plant was found to have antimicrobial

	Kattha Fabaceae (Mimo-soideae)	Heartwood(sara)		*Krimghna, Mehhara, Jwarhar, Shothaghna, Kushtaghna, Raktashodha, Kaphaghna Kandughna and Vranaropaka*[xi]		activities against six species of pathogenic and non-pathogenic microorganisms : S. aureus, Bacillus subtilis, Staphylococcus aureus, Salmonella typhi, Escherichia coli, Pseudomonas aeruginosa and Candida albicans[xii]
3	*Abutilon indicum* Linn[xiii] *Atibala* Amaranthaceae	Herb Root, bark, flowers, leaves and seeds	Asparagin	*Balya, Kantikar, Snighdha, Grahi, Vatahara, Raktapittahara, Raktadoshnashak, and Vranaropak*[xiv]	Anti-inflammatory, Antibacterial Anti-tubercular Antioxidant, Hepatoprotective, Hypoglycaemic	In an in-vitro Chloroform fraction of alcoholic extract of whole plant of Abutilon indicum extract was found to be most effective against Staphylococcus aureus followed by Bacillus sublitis whereas in case of Gram-negative bacteria, extract was found to be most effective against Escherichia coli showing the maximum zone of inhibition followed by Pseudomonas aeruginosa.[xv] In an in-vitro experiment, Bioactive components present in the ethanolic leaf extract of A.indicum shows good anti-

							inflammatory and anti-proliferative activity based on 5-Lipoxygenase (5-LOX) inhibition assay. It has also shown anti-proliferative activity on human Caucasian lung carcinoma of A549 cell line.[xvi]
4	*Adhatoda vasica* [xvii]Nees *Vasa* Acanthaceae	Shrub Leaves, roots, flowers and stem bar	Leaves contain quinazoline derivatives such as vasicine, vasicinone, B-sitosterol, Kaempferol, 1-peganine, Aadhatodine, Vasicolinone and Anisoline.	*Vatakarak, Hridya, Raktashodhaka, Raktastambhana, Shleshmahara, Pittahara Kasahara, Shwasahara, Kanthya, Mootrajanana, Svedajanana, Jwaraghna, Pramehahar, Trishnahara , Kshayahar and Kushthaghna* [xviii]	Bronchodilator Expectorant Abortifacient	Vasicine, the main alkaloid of Adhatoda vasica showed potent anti-inflammatory activity at a dose of 50 µ/pellet equivalent to that of hydrocortisone when evaluated in-vitro by the modified hen's egg chorioallantoic membrane test.[xix] Vasicine acetate and 2-acetyl benzylamine isolated from hexane extract of A.vasica leaves was found to be significantly inhibit M. tuberculosis and one multi-drug-resistant (MDR) strain and one sensitive strain at 200 and 50µg/ml, respectively.[xx] In a study conducted on

						rats, rabbits, hamsters and guinea pigs; it was found that vasicine has uterotonic and abortifacient effects possibly by enhancing the synthesis and release of prostaglandins. In this study dose dependent effect was observed with effective doses ranging between 2.5 to 10 mg/kg[xxi]
5	*Aerva lanata* Juss.[xxii] *Gorakshganja Gorakhbuti* Amaranthaceae	Herb Roots, Dried Leaves and Flowers	Plant contains a-Amyrin, Campesterol, b-sitosterol, b-sitosteryl palmitate chrysin, Aervin, b-ecdysone, Aervitrin, Aervolanine, Aervoside and Amysine.	*Shothahara, Vedanasthapana, Jantughna, Stambhana, Hridya, Raktashodhaka, Raktastambhana, Shleshmahara, Kasahara, Shwasahara , Kanthya, Mootrajanana , Svedajanana, Jwaraghna, and Kushthaghna*	Lithotripsic Anti-inflammatory Suppurative Diuretic Vermifuge	In an in-vivo study conducted on rats, new hydrogenated naphthol isolated from methanolic extract of the flowers of the Aerva lanata (L.) showed Anti-urolithiatic activity by reducing the deposition of calcium oxalate crystals by increasing their solubility and restoring the normal renal architecture.[xxiii] The HIV-RT inhibitory activity of Phytotesrols prepared by Sequential maceration method, extracted from roots of Aerva lanata was

						found to be remarkable thus showing Anti-HIV activity[xxiv]
6	*Ailanthus excelsa* Roxb[xxv] *Aralu Ghoda neem* Simarubaceae	Tree Stem Bark	Quassinoids, alkaloids, flavonoids, terpenoids, and proteins	*Twagdoshahara*, *Vranshodhana Deepana*, *Pachana*, *Grahi*, *Krimighna*, *Raktashodhaka*, *Raktastambhana*, *Kasahara*, *Sandhaneeya*, *Yonidoshahara*, *Jwaranashaka*, *Lekhana*, *Madhuryanashaka* and *Vishaghna*	Anti-fungal Anti-fertility Anti-pyretic Anti-inflammatory Analgesic activity	In an in-vitro study, it was found that the ethyl acetate extract of Ailanthus excelsa bark showed significant antifungal activity against fungal strains A. terrus, A. niger and A. flavus at 1 mg/ml when investigated using cup plate method of experiment.[xxvi] In an in vivo study conducted on rats, hydroalcoholic extract of stem bark of Ailanthus excelsa Roxb (Simaroubaceae) showed strong antifertility effect measuring upto 72% antiimplantation and 56% abortifacient activity[xxvii]
8	*Azadirachta indica* A. Juss[xxviii] *Nimba Neem* Meliaceaa 503	Tree Leaves	Leaves contain Nimbin, Nimbinene, Nimbandiol, Nimbolide, Quercitin, g-sitosterol, Azadirone, Azadiradione and Azadirachtin. Bark has Nimbin,	*Krimighna Vranapachana Vranashodhana*, *Grahi, Ahridya, Vatahara, Shramhara, Trishnahara, Kasahara, Jwarahara, Rochana, Kaphaghna,*	Anti-inflammatory Antipyretic Hypoglycemic Antifungal, Antibacterial	Neem leaf extract (NLE)in the dose of 125 mg/kg body weight showed significant reduction in inflammation at 3rd and 4th hour when tested upon paw edema (carrageenin

			Nimbinin, Nimbidin, Margolone and Margolonone. Seeds contain Nimbin, Nimbidin, Azadirachtin, Chloro- genic acid, Salanin and 4-Epinimbin. Flowers possess Nimbosterol, Myricitin and Kaempferol.	*Pittaghna, Kushthaghna and Pramehaghna* .[xxix]		infused) in rat thus showing remarkable Anti-inflammatory activity.[xxx] In an in-vivo experiment NLE in the dose of 125mg/kg body wt. showed significant antipyretic effect when tested on Brewer's yeast induced pyrexia in Albino rats while using Paracetamol as the referencestandard drug [23]
9	*Balanites aegyptiaca* (Linn.) Delile[xxxi] *Ingudi Hingot* Balanitaceae	Tree Roots, Bark,Fruit	Fruit contains Diosgenin, Cryptogenin, Leaves contain Saponin of diosgenin, Stigmasterol. Stem bark has Deltonin, Protodeltonin, Saponin, Marmesin and Syringic acid.	*,Bhootadi grahbadhanashak, Vranaropana , Krimighna, Vishaghna Shweta-kushthaghna, Vishaghna, and Shoolaghna* [xxxii]	Anthelmintic Antibacterial Purgative Antifungal Anti-hyperglycaemic Spasmolytic Emetic Hepatoprotective	In an in-vitro experiment, the alcoholic extract of Balanites aegyptiaca fruit showed total mortality at 5 hours at 125 mg;ml concentration against amphistome Paramphistomum Cervi suggesting potential Anthelminthic properties.[xxxiii] Administration of the aqueous extract of fruit pulp to biliary duct-ligated rats showed a dose-dependent significant decrease in serum bilirubin level.[xxxiv]

10	*Bambusa arundinacea* Willd.[xxxv] *Vansh Bans* Gramineae	Shrub Root, Dried Resin, Tender Shoots	Root contains Silica, Betain, Potash, Peroxide of Iron and Cyanogenetic glycosides. Vamsalocana has Silica, Iron peroxide, Potassium, Aluminium and Glycosides	*Bastishodhana, Chedana, Kaphaghna, Pittaghna, Kushtaghna, Shothhara, Raktashodhaka, Vranaropak* [xxxvi]	Expectorant Haemolytic Antipyretic Analgesic Anti-inflammatory Ulcer healing	Methanolic extract of Bambusa arundinacea leaves has shown the great antiradical scavenging, metal chelating and nitric oxide scavenging capacity with phenolic content upto 14.6 mg gallic acid equivalent/g powder.[xxxvii] In an in vitro GC-MS analysis, Bambusa arundinaceae leaves showed considerable antimicrobial activity and heamolytic activity against human blood erythrocytes (RBCs) and the % lysis of RBCs was found to be in the range of 1.03 to 4.81.[xxxviii]
11	*Barleria prionitis* Linn.[xxxix] *Saraiyak Katasareya* Acanthaceae	Shrub Leaves, stems, roots, bark, and flowers	Alkaloids, β-Sitosterol, Potassium	*Kushtaghna, Kandughna, Vishaghna, Keshranjan,Kaphaghna and Vatraktanashak* [xl]	Antipyretic Anti-inflammatory Expectorant Analgesic Anthelmintic	Methanol – water extract of Barleria prionitis Linn. exhibited significant anti-inflammatory activity against different inflammagens like carrageenan, histamine and dextran and when tested in adrenalectomised rats, it showed inhibition of

						vascular permeability and leucocytes migration into the site of inflammation while using Ibuprofen as a standard reference drug.[xli] In an In vitro experiment Ethanolic and aqueous extracts of whole plant exhibited paralysis in lower doses (50, 75 and 100 mg/ml) and also triggered death at higher concentration of 100 mg/ml against Pheretima posthuma worms.[xlii]
12	*Capparis sepiaria* Linn.[xliii] *Hinsra Heensa* Capparidaceae	Shrub Fruits and Roots	Leaves contain a & b amyrin, Taraxasterol, Erythrodiol, Betulin and b-sitosterol. Root contains Alkaloids, Glycosides, Anthocyanins, Fla- vonoids, Octacosanol and a Triterpene alcohol.	*Shothhara, Deepana, Rochak, Vednasthapana, Pittastravaka, Hridyauttejak, Raktashodhak, and Jwarahara*	Blood purifier, Antidiabetic, Tonic, Appetize	Ethanol extract of Capparis sepiaria leaves produced hypoglycemic effect at various dose levels 100, 200 and 300 mg/kg in the streptozotocin induced diabetic rats which was also compared with the standard glibenclamide at 10 mg/kg dose. after 12 h of treatment, maximum fall of plasma glucose level 9.40%; 13.57%; 15.25%

						and 18.80% was observed.[xliv]
13	*Carissa carandas* L.[xlv] *Karmard Karonda* Apocynaceae	Shrub Fruits, Roots, Leaves, Latex	Glycosides and â-Sitosterol	*Kaccha Phal: Ruchya, Raktapittakarak and Kaphvardhak* *Pakke phal: Rochana, Pitaghna and Vataghna.*[xlvi]	Cardiac tonic Anti-tubercularAnthelminthic Antimicrobial Histamine releasing activity	The ethanolic extract of roots of C. carandas exhibited cardiotonic activity and lowered the blood pressure at the dose 45 mg/kg in normal rats.[xlvii] The fruits extract of C. carandas causes earthworm (Pheretimaposthuma) paralysis and also its death after some time when tested in vitro at different concentrations (50, 100, and150 mg/ml) in solvent petroleum ether (60-80), ethanol and chloroform .[xlviii]
14	*Cassia fistula* Linn.[xlix] *Aragwadh Amaltas* Fabaceae (Caesalpinioideae)	Tree Root bark, leaves, flowers, fruit pulp	Pod pulp-Anthraquinone, sucrose, lignoceric acid, amino acids Root bark - Anthraquinone derivates, sennoside A&B, Fistucacidin, g-sitosterol, Volatile oil. Stem bark and Leaves - Rhein glycoside.	*Uttam Rechaka, Jwarahar, Hridya, Raktapittashamak Vataghna, Udavartanashak and Shoolaghna.* ***Phala:*** *Kushthaghna, Shreshtha-mriduvirechaka, Rochaka Pittashamaka Kaphaghna.*[l]	Purgative Febrifuge Anti-inflammatory Antioxidant Anti-microbial	All the extracts from the flower of Cassia fistula exhibited antibacterial activity against Gram-positive organisms with minimum inhibitory concentrations (MIC) between 0.078 and 2.5 mg/ml and only Pseudomonas aeruginosa among the Gram-negative bacteria other than this antifungal activity against Trichophyton

						mentagrophytes (MIC 0.5 mg/ml) and Epidermophyton floccosum (MIC 0.5 mg/ml) were also observed.[li] Aqueous suspension of sun dried (SD) and Non sun dried (NSD) were administered orally in rats 60 min before experiment, both SD and NSD in the dose of 1.0 g/kg showed an increase in the number of defecations and fecal output 4 hour after treatment, only difference was that the stool was semisolid with SD and semisolid and watery with NSD.[lii]
15	*Cassia occidentalis* Linn.[liii] *Kaasmarda Kasonda* Fabaceae (Caesalpinioideae)	Herb Leaf, seed, roo	Chrysophanol, emodin, glycosides, physcion and miner- als like Calcium, Phosphorous, Iron.	*Ruchivardhaka, Vrishya, Pachak, Kanthshodhaka, Grahi, Kasaghna, Vishaghna Raktadoshanashak, Kaphaghna, Vataghna,* [liv]	Thermogenic Purgative Expectorant Febrifuge Anti-inflammatory Anti-allergic	Methanol (MeOH) extract of dried seeds of C. occidentalis was evaluated against three respiratory tract pathogens i.e. Staphylococcus aureus MTCC 1144, Streptococcus pneumoniae MTCC 655 and Streptococcus pyogenes MTCC 442 using Amoxicillin as positive control to determine

						the sensitivity of the strains and it showed the zone of inhibition ranged between 20.9±0.21 to 23.1±0.15 mm, thus corroborating the traditional use of it in the treatment of respiratory tract infection.[lv] In an in-vivo model of ovalbumin (OVA)-induced asthma in mice, anthraquinones (AQs) extracted from C. occidentalis was found to decreased inflammatory cell counts and production of Th2 cytokines (IL-4, IL-5 and IL-13) in bronchoalveolar lavage fluid, and OVA-specific IgE in serum, thus showing promising ethnopharmacological use.[lvi]
16	*Citrus medica* Linn.[lvii] *Matulunga Bijoura* Rutaceae	Shrub Fruit, leaves, bark	Fruit contains campesterol, Stigmasterol, Sitosterol and Cholesterol.	*Deepana*, *Hridya Kanthya*, *Hridyashodhan*, *Shwasahara, Kasahara, Rochaka, Trishnahara* [lviii]	Anthelminthic Analgesic activity Antinociceptive and Anti-inflammatory Cardiac stimulant Haemostatic Anti-inflammatory Antioxidant Hypoglycaemic	In a study, carried out using male albino rats (150-200g), flavonoids and phenolic compounds found in decoction of C. medica Linn.fruits showed significant

						analgesic effect, when given in three different doses (1, 2 and 4ml/kg p.o.), analgesic effect of 4ml/kg decoction was observed comparable to the standard drug Diclofenac sodium (10mg/kg i.p).[lix] Citron peel alcoholic extract (subjected to cold extraction using 70% alcohol) exhibited significant antinociceptive and anti-inflammatory activities in an in-vivo Carrageenan induced rat paw edema model and in vitro HRBC membrane stabilization assay.[lx]
17	*Cocculus hirsutus* Linn. Diels[lxi] *Patalgarudi Jalajamani* Menispermaceae	Climber Bark, Leaves, Heartwood, Seeds	Root has alkaloids like Shaheenine, Cohirsinine, Hirsutine and Corsitinine. It also contains Tannin.	*Vrishya*, *Kaphaghna and Vataghna*[lxii]	Immunomodulator Anti-inflammatory Aphrodisiac Antioxidant and Anti-atherogenic activities Anti-diabetic	In an in-vivo study the aqueous leaf extract of C. hirsutus (250, 500, and 1000 mg/kg, p.o.) showed significant ($P < 0.01$) reduction of serum glucose level in alloxan-induced diabetic mice. In oral glucose tolerance test, aqueous extract of C. hirsutus increased the

						glucose tolerance.[lxiii] In an in-vivo experiment, Ethanolic extract of Cocculus hirsutus leaves showed significant decrease in symptoms of formaldehyde Induced arthritis in rats.[lxiv]
18	*Croton tiglium* Linn.[lxv] *Jaipal Jamalgota* Euphorbiaceae	Tree Seeds	The seeds yield fatty oil composed principally of stearin, Palmitin, Glycerides of Crotonic and Tiglic acids, proteins 18%, a glucoside called crotonoside and also have alkaloids.	*Rechana, Pittaghna and Kaphaghna*.[lxvi]	Anthelmintic Purgative Insecticidal Anti-tumour Thermogenic Digestive Carminative Anti-inflammatory Expectorant Irritant	In vitro antitumor experiments showed that C. tiglium essential oil treatment significantly inhibited the proliferation and migration of A549 cells, disrupted the cell cycle process, and reduced the expression levels of cyclin A, cyclin B and CDK1.[lxvii] Percent efficacy of capsulized Croton tiglium seeds on Ascaridia galli/Heterakis gallinarum at 200 mg and 400 mg was found to be highly effective on 12th day when tested on the gastrointestinal parasites of native chickens (Gallus domesticus) in an experiment following a complete

						randomized design.[lxviii]
20	*Eclipta alba* Hassk[lxix] *Bhringraj Bhangra* Asteraceae	Herb Leaves, stem, root	Leaves - ß-terthienyl-methanol, stigmasterol, ß-amyrin, Desmethyl wedelolactone glucoside Amino acids-cystine, glutamic acid, phenylalanine, tyrosine and methionine. Whole plant - Phytosterol-A, x-amyrin, Wedelolactone, Triterpenic acid, desmethyl wedelolactone, fatty acids like-palmetic, stearic, oleic and linoleic acids, nicotine. Root - Hentriacontanol, 14-heptaosanol, stigmasterol	*Kaphaghna, Vataghna, Keshya, Twachya, Chakshushya, Shwashara, Kasahara, Krimighna, Shothaghna, Dantya, Rasayan, Balya, and Kushtaghna, Netrarogahara, Shirorogahara*[lxx]	Antihepatotoxic Antiviral Antibacterial Analgesic Antileprotic Anti-catarrhal Hair growth promotor	Hexane extract of Eclipta alba showed high antibacterial activity against S.aureus, B.cereus, E.coli, S.typhi, K.pneumoniae,S.pyogenes and P.aeruginosa when investigated in-vitro using agar well diffusion methods and compared with standard antibiotics (Ciprofloxacin 25 µg/ml). [lxxi] In an in-vivo experiment, Alcoholic extract of Eclipta alba is known to exhibit protective effect on experimental liver damage in rats and mice by showing 72.8% reduction of hepatic lysosomal acid phosphatase and restoration of alkaline phosphate.[lxxii]
21	*Ficus glomerata* Roxb.[lxxiii] *Udumbara Gular* Moraceae	Tree Leaves, Fruit, Bark, Latex	β-Sitosterol, Lupeol Acetate and Carbohydrates	*Varnya, Vranaropana, Vranashodhan, Pittaghna, Kaphaghna and Raktvikaranashak*[lxxiv]	Astringent Anthelmintic Anti-diuretic	The crude extracts of bark showed anthelmintic activity when evaluated using adult earthworms; they exhibited a dose-dependent inhibition of

						spontaneous motility (paralysis) and evoked responses to pin-prick, which was comparable with that of 3% piperazine citrate suggesting wormicidal activity.[lxxv]
22	*Grewia asiatica* L.[lxxvi] *Parushaka Phalsa* Malvaceae	Shrub Leaves, roots, bark.	Fruit contains Tannin, Leucanthocyanins, Leysin, Proline, Glutaric acid, Arabi- nose. Quercitin and Glucose. Bark has Triterpenoid-erythroodiol, Taraxerol, B-sitosterol, Lupeol, Betulin, Friedelin and B-Amyrin Bark has Triterpenoid-erythroodiol, Taraxerol, B-sitosterol, Lupeol, Betulin, Friedelin and B-Amyrin	*Brihana*, *Vishtambhak, Jwarahara*, *Kshayahara*, *Vataghna, Raktadoshanashak, Hridya, Dahashamak and Pittaghna*[lxxvii]	Anti-bacterial Anti-diabetic Hypotensive Anti-cancer Anti-inflammatory Analgesic activity	Ethanol extracts of Grewia asiatica leaves showed more significant ($p<0.01$) reduction in blood glucose level compared to the control using glibenclamide as standard (10 mg/kg b.w. p.o.) in an in-vivo study conducted on alloxan induced diabetic Wister rats.[lxxviii] In an in-vivo study, the methanolic extract of Grewia asiatica (MEGA) and aqueous extract of root bark of G. asiatica exhibits peripheral and central analgesic effec,t which was studied using acetic acid-induced writhing in mice and anti-inflammatory activity, which was investigated

						using carrageenan induced paw oedema in rats.[lxxix]
23	*Helicteres isora* Linn.[lxxx] *Avartani Marodphali* Sterculiaceae	Shrub Fruits and Roots	Fruits have a and b-amyrins, Friedlin, Lupeol, Taraxerone and Lactic acid. Seed contains Diosgenin. Roots have Cucurbitacin B and Iso Cucurbitacin B.	*Pittaghna, Vatghna, Jwarahara, Raktavikarnashak, Bhutaghni, Rakshoghni, Kushtaghna, and Kasaghna*.[lxxxi]	Vermifuge Astringent Anti-spasmodic Haemostatic Anti-diabetic Anti-cancer Anti-oxidant	In an in-vitro study, Antioxidant activity of the phenolic extracts from H. isora fruits was seen to be done by inhibition of reactive oxygen mediated erythrocyte cell lysis and metal ion chelating activity.[lxxxii] Anti-spasmotic activity of the fruits of the helicteres isora was checked in vitro on guinea-pig ileum against acetylcholine, histamine and diphenhydramine and was found to be significantly comparable to atropine and diphenhydramine hydrochloride (standard drug).[lxxxiii]
24	*Holoptelea integrifolia* Planch.[lxxxiv] *Chirabilva Kanju* Ulmaceae	Tree Barks and Leaves	Bark contains Holoptelin A & B, Friedelin, Epifriedelinal and ß-cytosterol. Leaves have Hexa Cosanol, Octacosanol, B-Cytosterol and ß-amyrin. Seeds yielded Aminoacids, fatty acids,	*Arshohara, Vamaghna, Pittaghna, Krimighna, Pramehghna, and Kushthaghna,* [lxxxv]	Carminative Anti-inflammatory Anthelmintic Urinary astringent Laxative	Methanolic and aqueous extracts of the Holoptelea integrifolia stem bark against adult earthworm Pheretima posthuman showed dose dependent anthelminthic activity was

			Palmitic acid and ß-Sitosterol.			significantly comparable to the standard drug i.e. Piperazine citrate.[lxxxvi] Aqueous (@ 500 mg/kg), ethanolic (@ 250, 500 mg/kg)and methanolic (@ 100, 500 mg/kg) leaf extract of H. integrifolia showed a significant inhibition of paw oedema formation in carrageenan-induced paw oedema test thus supporting anti-inflammatory activity[lxxxvii]
25	*Murraya koenigii* (L.) Spreng.[lxxxviii] *Kaidarya Kadi Patta* Rutaceae	Tree Leaves	Leaves contain Koenidien, Mahanine, Cyclomalanimicine and Koeine isomahanimbine. Leaves and fruits contain volatile oil. Root contains Carba- zole and Keoline Stem bark has Bimahanine, Carbazole.	*Dipana, Pachana, Sanjanasthapana, Keshya, Twachya, Krimighna, Netrya, Vednasthapana and Anulomana.*	Anti-microbial Anti-diarrhoeal Anti-cancer Anthelmintic Anti-inflammatory Analgesic activity	The alcohol extract of stem bark (1 gm/kg body weight) showed very promising anti-inflammatory results in carrageenan-induced inflammation in rats and Ethanolic extract of M. Koenigii (300 and 400 mg/kg) also showed antihistaminic actions in the histamine-aerosol protocol[lxxxix] The n-hexane extract of the seeds of Murraya

						koenigii Spreng (Rutaceae) exhibited significant inhibitory activity against castor oil-induced diarrhoea and PGE (2)-induced enteropooling in rats.[xc]
26	*Pandanus odorotissimus* Linn[xci] *Ketki Kewara* Pandanaceae	Shrub Flower, Leaves, flower fruits	Essential oil	*Chakshushya and Kaphaghna* [xcii]	Anti-diuretic Clastogenic Anti-inflammatory CNS stimulant Anticholinergic	The ethanol (37.03% inhibition) and aqueous extracts (63.22% inhibition) of prop roots of Pandanus fascicularis (P. fascicularis) Lam (pandanaceae) produce significant anti-inflammatory activities in carrageenan-induced edema of the hind paw of rats and found to be nearly equivalent to that of 10 mg/kg of indomethacin (67.81%)[xciii] In an in-vivo experiment, the ethanol and aqueous extracts of the prop roots of Pandanus fascicularis and ADH (Standard) significantly impaired the total urine output in rats following oral administration. [xciv]

27	*Pongamia pinnata* Pierre[xcv] *Karanja Karanja papdi* Fabaceae	Tree Root, Bark, Leaves	Oleic, stearic, palmitic, linoleic, linolenic, behenic, and eicosenoic acids	*Yonirogahara, Udavartahara , Kushthaghna, Gulmahara, Arshoghna, Vranaropana, Krimighna,, ,and Kaphahara*[xcvi]	Antipyretic Hypoglycemic Anthelmintic Hypotensive Wound healing Insecticidal Antibacterial	The methanol extracts of pongamia pinnata Linn, leaves were found to be highly significant in reducing yeast-induced elevated body temperature in rats in a dose dependent manner, it's effect at 200mg/kg body wt. was parallel to that of the standard anti-pyretic drug paracetamol[xcvii] P. pinnata ethanolic extract and aqueous extract showed significant ($P < 0.001$) antidiabetic activity in alloxan-induced diabetic albino rats when compared with glibenclamide (600 µg/kg b. wt.)[xcviii]
28	*Prosopis spicigera* Linn.[xcix] *Shami* Fabaceae	Tree Leaves, Pods	Tannin rich foliage, volatile fatty acid.	*Rechan, Kaphaghna, Kashara, Shwashara, Kushtaghna, Arshoghna,* and *Krimighna,*[c]	Analgesic Antidepressant Shwashara Muscle relaxant Antipyretic Anticonvulsant	The leaf extract at doses of 200 mg/kg significantly decreased the duration of immobility time in Forced swim test (FST) when tested on mice and was found to be comparable to that of imipramine (15 mg/kg. p.o) thus

						exerting antidepressant-like effect.[ci] Doses of the ethanolic extract Prosopis cineraria roots at the dose 200mg/kg & 300mg/kg was studied using hot-plate method and tail-immersion method in rats and was found to have potential analgesic properties.[cii]
30	*Putranjiva roxburghii* Wall[ciii] *Putranjivak Jiyapota* Putranjivaceae	Tree Leaves, seeds, bark, and roots	Seeds contain fatty oil, Oleic acid, Linoleic acid and stearic acid. The oil prepared from seed has Glucoputranjivin and Glucojiaputin	*Kaphaghna, Vataghna , Anulomana, Mutrala , Vrishya ,Balya, and Prajasthapna* [civ]	Anti-inflammatory Analgesic Antipyretic	The ether extract from the leaves of Putranjiva roxburghii (100, 200, and 400 mg/kg, p.o.) dose-dependently produced analgesic activity in acetic acid-induced writhing in mice. At the dose of 400 mg/kg of the same extract, decreased fever induced by yeast in rats and inhibited croton oil-induced ear edema in a dose-dependent manner (1.25, 2.5, and 5.0 mg/ear) in mice thus showing analgesic, antipyretic and anti-inflammatory properties.[cv]

31	*Sida cordifolia* Linn.[cvi] *Bala Bariyara* Malvaceae	Herb Roots, seeds, and aerial parts	Seed contains: Ephedrine, Fatty oil, Steroids, Phytosterol, Resin, Resin acids, Mu- cin, Potassium nitrate. Root contains: Ephedrine, Hypaphorine, Vasiscinone, Vasicine, Vasiscinol, Cho- line, Betaine.	*Balya, Grahi, Vatahara, Raktapittaghna, Kantikar, Raktadoshanashak, Vranaropaka* [cvii]	Anti-inflammatory Immunomodulatory Aphrodisiac Diuretic Analgesic Hepatoprotective Emollient Cardiac tonic	Ethyl acetate and alcohol extracts of S.cordifolia exhibited significant anti-inflammatory activity only at a dose level of 600 mg/kg when studied in edematous rats, S. cordifolia root and aerial extract exhibited significantly ($p < 0.001$) better activity than that elicited by aspirin (standard drug).[cviii] In an vivo experiment, Hepatic regeneration activity of the aqueous extract of Sida cordifolia was assessed by immunohistochemical staining for proliferating cell nuclear antigen (PCNA) using the PC-10 monoclonal antibody in rat who underwent 67% partial hepatectomy immediately after oral administration of 100, 200 and 400 mg/kg of the aqueous extract of Sida cordifolia and the results shows Sida100 and Sida200

						groups disclosed significant liver regeneration indices than control group ($p<0.001$ and $p<0.05$, respectively). Fumaric acid isolated from S.cordifolia was reported to be Hepatoprotective.[cix]
33	*Terminalia bellirica* Roxb.[cx] *Vibhitak Bahera* Combretaceae	Tree Leaves Bark and Fruit	Firmût-Contains-Tannin (20-30%), gallic acid, ellagic acid, phyllemblin, ethyl gal late, gallocyl glucose, g - sitosterol, chebulagic acid, mannitol, glucose, galactose, fructose, rhamnose, bellericanin (Cardiac glycoside). Kernel - Contains- Yellow fatty oil possessing fatty acid, like palmitic, oleic and linoleic acids. Seeds- Contain- Protein, Oxalic acid and non-edible oil. Bark-Contains Tannin, Oxalic acids	*Kaphaghna Pittaghna, Bhedana*, *Anulomana, Kasahar, Chakshushya, Keshya, Krimighna, Chakshushya* [cxi]	Astringent Anti-diabetic Hepatoprotective Expectorant	The blood sugar level in normal and alloxan diabetic rats reduces significantly within 4 h by Oral administration of 75% methanolic extract of T. chebula (100 mg/kg body weight).[cxii] The 95% ethanolic extract of T. chebula fruit showed hepatoprotective activity against anti-tuberculosis (anti-TB) drug-induced toxicity which could be attributed to its prominent anti-oxidative and membrane stabilizing activities.[cxiii]

Table 2: Distribution of families of medicinal plant species documented during the study

S.No	Family Name	No of Plant Species

1.	Acanthaceae	02
2.	Apocynaceae	01
3.	Asteraceae	01
4.	Balanitaceae	01
5.	Capparidaceae	01
6.	Combretaceae	01
7.	Convolvulaceae	01
8.	Euphorbiaceae	01
9.	Fabaceae	06
10.	Gramineae	01
11.	Malvaceae	03
12.	Meliaceae	01
13.	Menispermaceae	01
14.	Moraceae	01
15.	Myrtaceae	01
16.	Pandanaceae	01
17.	Putranjivaceae	01
18.	Rubiaceae	01
19.	Rutaceae	02
20.	Salvadoraceae	01
21.	Ulmaceae	01

Figure 1 Adhatoda vasica Nees (Vasa)

Figure 2 Aerva lanata Juss. (Gorakshganja)

Figure 3 Ailanthus excelsa Roxb. (Aralu)

Figure 4 Balanites aegyptiaca (Linn.) Delile (Ingudi)

Figure 5 Barleria prionitis Linn (Saireyeka)

Figure 6 Cassia occidentalis Linn. (Kaasmarda)

Figure 7 Capparis sepiaria Linn (Hinsra)

Figure 8 Carissa carandas L. (Karmard)

Figure 9 Cocculus hirsutus Linn. Diels (Patalgarudi)

Figure 10 Cuscuta reflexa Roxb (Akashvalli) Figure 11 Eclipta alba Hassk (Bhringraj) Figure 12 Holoptelea integrifolia Planch (Chirabilwa)



Figure 13 *Pandanus odorotissimus* Linn (*Ketki*) *Figure 14 Pongamia pinnata Pierre (Karanja) Figure 15 Putranjiva roxburghii Wall (Putranjivak)*

Figure 16 *Salvadora persica* Linn.*(Peelu)*

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