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ETHNOMEDICINAL PLANTS USED FOR PRIMARY HEALTH CARE BY INDIGENOUS COMMUNITY OF DEVPRAYAG BLOCK (TEHRI GARHWAL, UTTARAKHAND, INDIA)

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ABSTRACT

Uttarakhand state, a part of Indian Himalayan Region (IHR), serves as a reservoir of diverse life forms, known for its rich biodiversity and unique climatic conditions. Due to the wide range of medicinal plants naturally available in this region, local communities use them for Primary Health Care (PHC). Indigenous plant species also serve as a source of timber, fuel, food, dye, fibre, fodder, etc. Plants utilization at local level sustains livelihoods in rural and remote hilly regions. Ethnomedicinal plants have received inadequate attention in the selected study area. The valuable plants-based information needs to be systematically documented. The present study aims to explore and document plant species used frequently by the indigenous community of Devprayag block in the treatment of various diseases and also to highlight some plants used in multiple diseases. Periodic field surveys were conducted in the study area and data were collected using semi structured questionnaire, and group discussions. Mainly aged local inhabitants, local female practitioners (Daayi) and traditional herbal healers (Vaidyas) were interviewed during door-to-door surveys in Hindi or local dialect (Garhwali). A total of 87 plant species belonging to 46 families were documented as local ethnomedicinal resources, where Asteraceae and Moraceae were found most dominating. Among the documented plants, 38% species were herbs, followed by trees (35%), shrubs (24%) and climbers (3%). The study reveals that about 42 kinds of human ailments were cured through ethnomedicine by the indigenous people, where highest number of species (15) were used in the treatment of fever, followed by the cough, dysentery, gum infection, skin burn, toothaches (12 species each); constipation (11 species); diabetes, mouth ulcer, wound healing (10 species each). This study provides valuable information about the plants used by indigenous people of study area for PHC. The study also reveals that local communities still have impressive traditional knowledge and this can be link to advance science for the preparation of drugs. Utilizing this traditional knowledge in day to day life can prevent hazardous chronic diseases.

Keywords: Traditional Knowledge, Garhwal Himalayas, Biodiversity, Genetic resources, Indigenous Plant species,

INTRODUCTION

Uttarakhand, a herbal state, located in Indian Himalayan Region (IHR) known for its rich biodiversity and unique climatic condition. Uttarakhand has a forest cover of 24,305 square kilometres, which constitutes approximately 45.44% of the state's total geographical area (ISFR, 2023). According to State Medicinal Plants Board, Uttarakhand (2014), there are nearly 700 species of medicinal plants used in traditional system of medicine. The state has several tribal communities like Bokshas, Bhotias, Gujjar, Marachchas, Tolchas, Jaunsaries, Kotlas, Gangwal, Ban rauat (Gaur, 2008). According to the World Health Organization, Global Centre for Traditional Medicine (2023) around 88% of the world's population rely on herbal medicine for their primary health-care requirements. In rural, hilly remote areas where access to modern medicinal facilities is limited, indigenous communities depend on ethnomedicine for health care (Boro, 2022). Interestingly, sometimes our modern science is unable to treat chronic illness without relying upon therapeutic treatment as substitute (Chauhan et al.,2022). Ethnomedicinal survey provide documentation of plants data, conservation needs and sustainable utilization of local wild plants and also help in preservation of cultural and genetic diversity (Raj et al.,2018). Indigenous communities used plants for past many centuries to cure various ailments such as Respiratory tract infections, Urinary tract infections, Gynaecological disorders, Dermatological

disorders, Wound healing, Diabetes, Gastrointestinal ailments, Snake bite, Fever, etc. (Kumar et al.,2019; Thakur et al.,2020; Renu et al.,2023). Medicinal plants play an essential role in primary health care as they are used to treat wide varieties of oral diseases because they possess antibiotic, anti-inflammatory properties, antidiabetic, antioxidant, antibacterial properties, etc. (Agbor & Naidoo, 2015; Kumar et al.,2019; Kumar et al.,2024). Plant-based traditional knowledge has become a recognized tool in search for new sources of drugs; it is clear that these herbal medicines can offer platform for further research (Kumar, 2014).

In rural areas ethnomedicinal practices serve as first line defence against various diseases providing cost effective solution with least side effects, fruitful results and availability. Communities sustain valuable traditional healing system and indigenous knowledge passed down verbally through generation to generation. The present study aims to explore and document medicinal plants used by inhabitants of Devprayag block of Tehri Garhwal in the treatment of various human ailments and also to highlight some plants which are used in multiple diseases.

MATERIALS AND METHODS

Study area

The study was conducted in Devprayag Block of Tehri Garhwal (Uttarakhand, India), located between the elevation 645m to 1,465msl, latitude 30.05286° N to 30.38069° N and longitude 78.50776° E to 78.92042° E **(Figure:1).** The region is known for its spiritual significance, natural beauty and rich plant diversity. It serves as the sacred confluence of the Bhagirathi and Alaknanda rivers, marking the origin of the Ganges. Annual average temperature ranges between 5°C to 35°C with annual rainfall of around 140-270mm.

The total area of Devprayag block is 217 km^2, consisting 256 villages with a total population of 51,482 (24,075 male population and 27,407 female population, source: euttaranchal.com). Most of inhabitants are engaged in traditional livelihoods, farming and livestock rearing. The demographic structure reflects predominantly rural and limited presence of semi-urban settlements, deeply rooted with cultural and traditional knowledge practices. The local people depend on traditional medicinal system for primary health care.

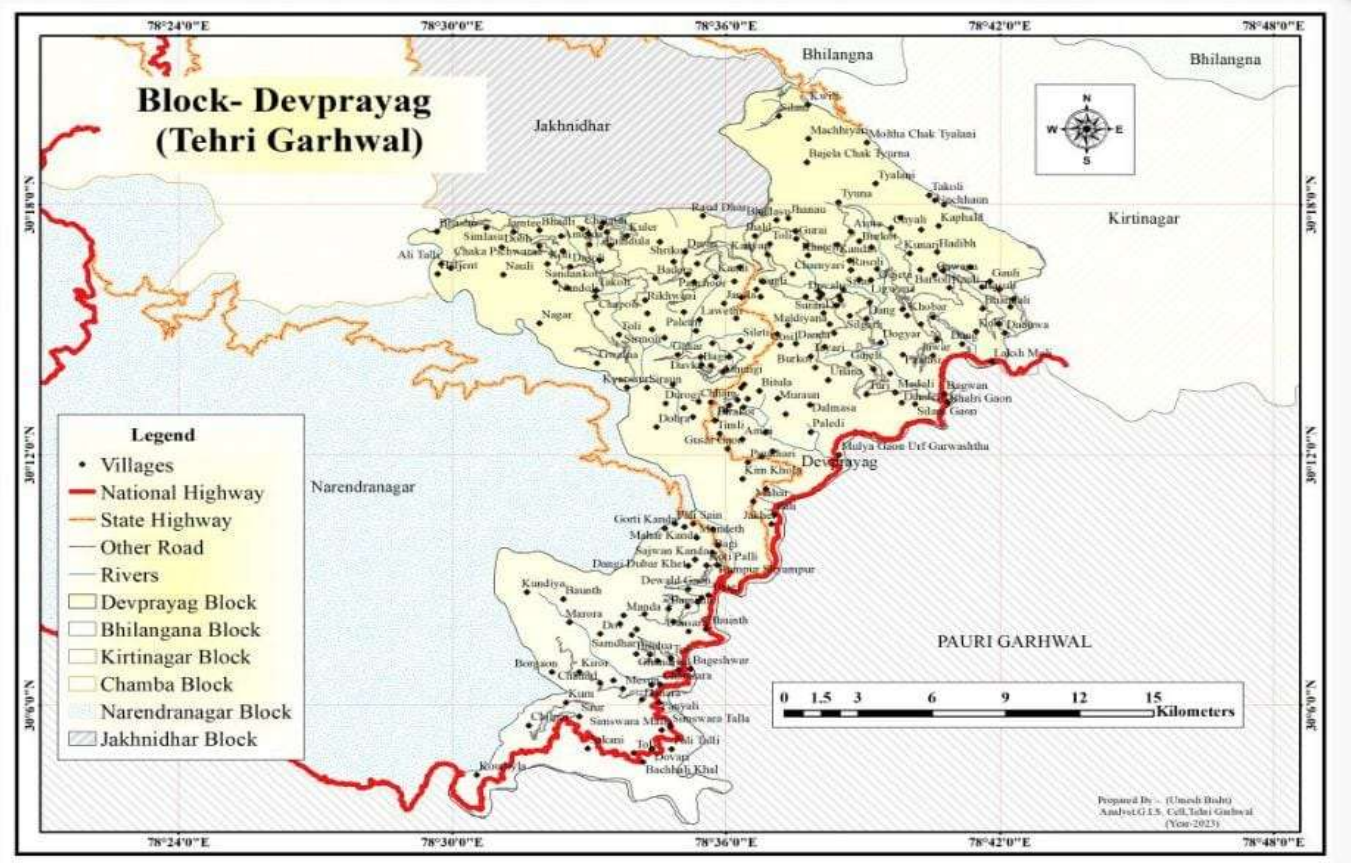

Figure 1: Location map of Devprayag block (Source: http://tehri.nic.in)

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Data collection

Extensive and intensive field surveys were carried out across the entire study area during the year 2024-2025. The survey comprised various consecutive visits, aimed at obtaining the maximum possible information about plants used in the treatment of various human ailments. Information was gathered from the local community, local traditional healers (Vaidyas) and individuals associated with Ayurvedic practices. Apart from general discussions on ethno-medicinal uses, detailed information regarding plants used in the treatment of human ailments, including their local names and the parts of plants utilized, was also obtained through structured and semi-structured questionnaires, interviews, and discussions with informants **(Table:1).** Questionnaire were prepared in English but the information was conveyed in local dialect (Garhwali) for more comfortability and acquiring more knowledge.

Plant identification

The collected plants were identified by taxonomists and this identification was subsequently cross-verified using the local floras (Gaur, 1999; Pusalkar & Srivastava, 2018). This rigorous process ensured the accuracy and reliability of the plant identifications.

RESULTS AND DISCUSSION

The traditional knowledge of curing various human ailments by the indigenous community of Devprayag block had been recorded and presented in this study. A total of 87 plants were documented belonging to 46 families **(Plate A and Plate B).** Among all these families, Asteraceae and Moraceae are among the most dominant ones, five species from each are being used as ethnomedicine, followed by Euphorbiaceae, Lamiaceae, Rosaceae, Rutaceae and Solanaceae (each representing four species) and Anacardiaceae, Polygonaceae, and Zingiberaceae (three species each) demonstrating their importance in traditional medicine **(Figure: 2).**

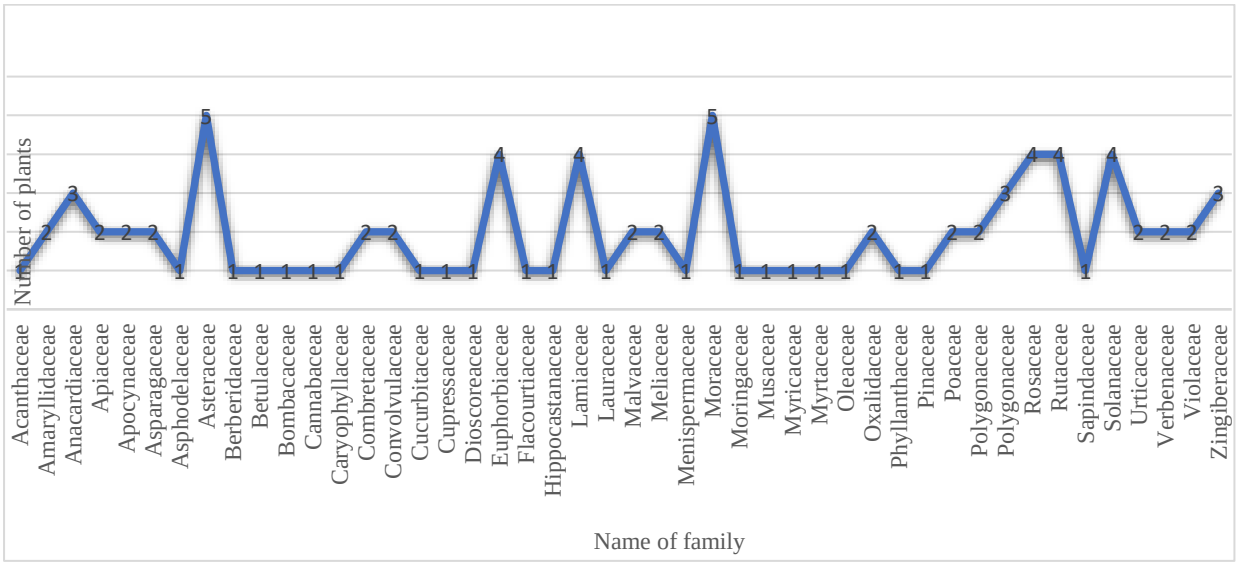

Figure 2: Number of ethnomedicinal plants from different families

In the present study the different life form of medicinal plants used by local people shows, 38% herbs, followed by trees (35%), shrubs (24%) and climbers (3%) **(Figure: 3).** Leaves, bark, roots, bulb, fruits, flower and underground parts of plants are used in the preparation of medicine in different proportions by the ethnic people **(Figure:4).** The local people use plants in various kinds of dermatological ailments, dental ailments, gastrointestinal problems, gynaecological issues, kidney problems, oral infections, anaemia, blood purification, blood sugar, animal bites, fracture, pain. Maximum number of plant species (15 species) were used in the treatment of fever, followed by cough, dysentery, gum infection, skin burn, toothaches (12 species); constipation (11 species); diabetes, mouth ulcer, wound healing (10 species).

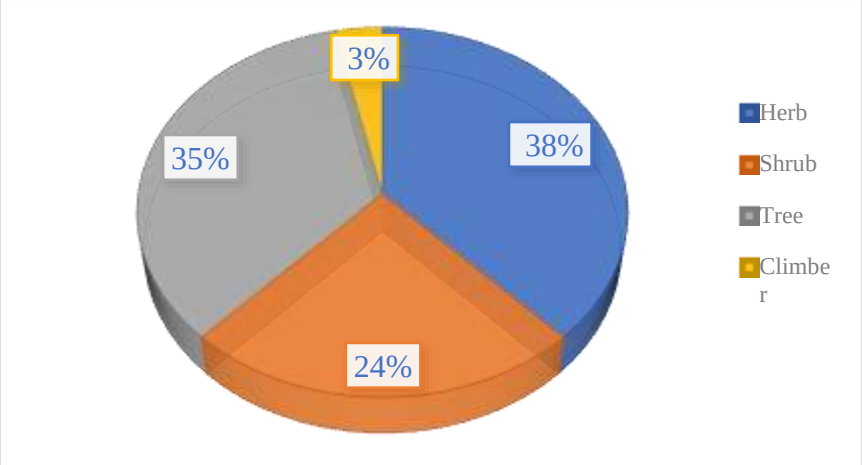

Figure 3: Proportion of different life forms used as ethnomedicinal plants

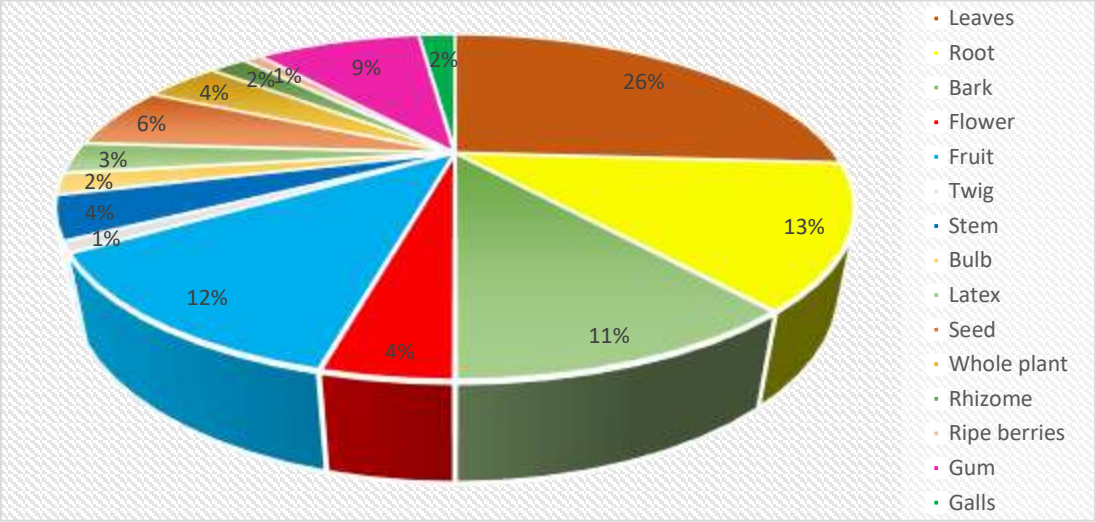

Figure 4: Proportion of different plant parts used in the ethnomedicinal purpose

High number of plants available for the treatment of single disease indicates the availability of natural resources and rich plant diversity. Simultaneously, the study also highlights that certain plant species are being utilized for the treatment of different kind of human ailments, indicating their significance and high utility for local people. The whole plant of *Eclipta alba* is used in the treatment of anti-inflammatory, fever, cough, wound healing, leprosy, jaundice, ulcer, hair blackening, hyperpigmentation and other skin ailments. *Centella asiatica* used in the treatment of constipation, leucorrhoea, jaundice, diarrhoea, dysentery, anti-inflammatory, fractures **(Figure:5)**

The result reveals that indigenous traditional practices play a vital role in primary health care. In remote areas, the use of traditional ethnomedicine is more demanding due to high cost of modern medicine (Kala,2005). Similar work has been done on Tharu tribe of Udham Singh Nagar district (Sharma et al.,2011), Kalimath valley district Rudraprayag (Semwal et al., 2013), Champawat district (Kharkwal et al., 2018), Bageshwar district (Pandey et al., 2017), Jaunsari tribe of Chakrata region (Kumar et al., 2019), Almora district (Rawat & Upadhaya, 2020) and Gujjar of Haridwar region (Ahmad et al., 2024), which supports that the local people of rural areas as well as urban areas still depend on traditional medicinal system for health care and well-being, where leaves and roots were most predominantly used plant parts (Singh et al.,2017; Khajuria et al.,2021). Besides beneficial aspects to humankind, over exploitation of resources are threat to ethnomedicinal plants, serious conservation efforts are needed to protect rare and endangered species, ensuring the sustainability of this invaluable knowledge (Mishra et al.,2017).

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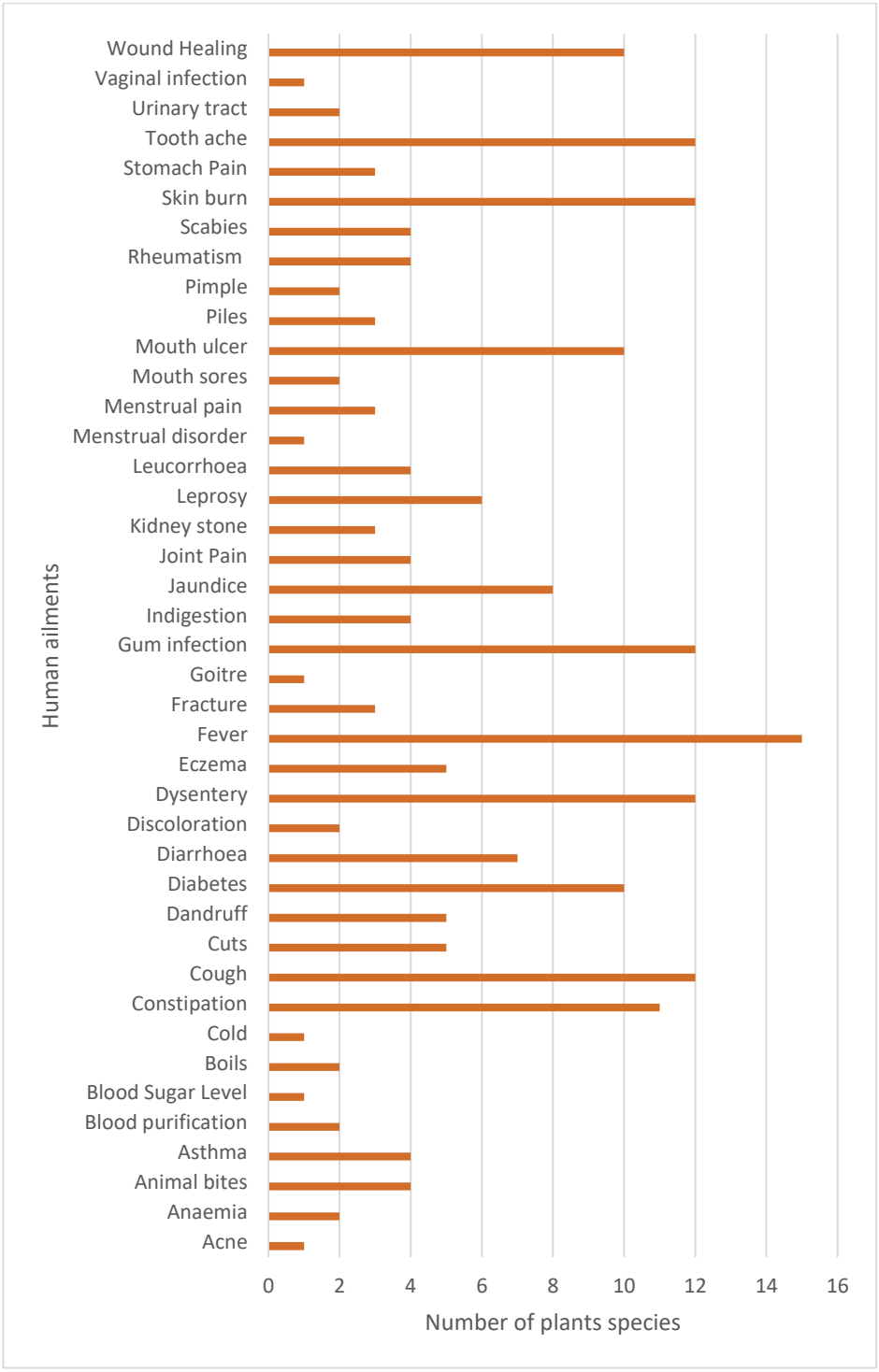
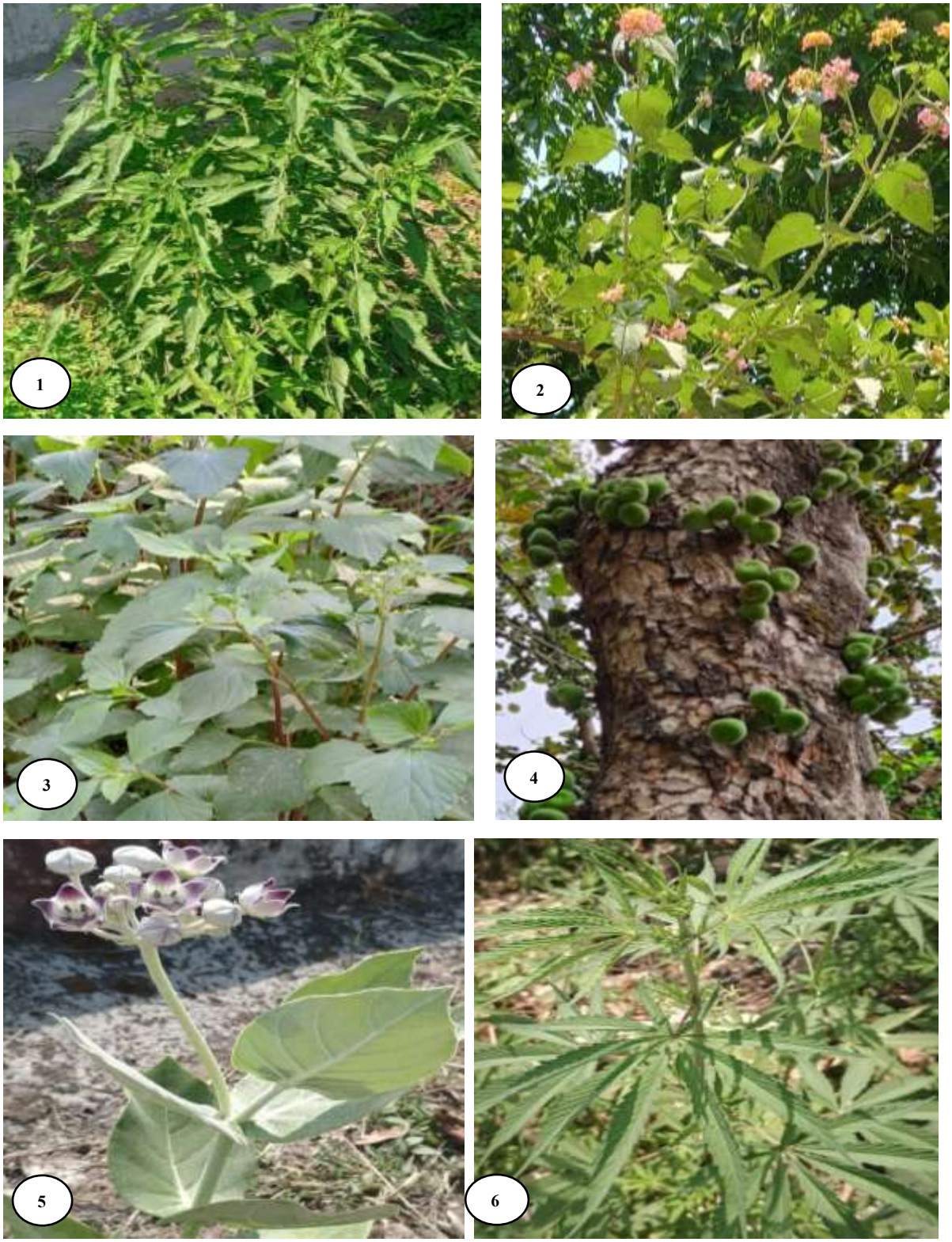


Figure 5: Number of plant species using in the treatment of various human ailments

PLATE A: some ethnomedicinal pants used for PHC



1. ***Urtica dioica*** **2.** ***Lantana camara*** **3.** ***Ageratina adenophora*** **4.** ***Ficus auriculata*** **5.** ***Calotropis procera*** **6.** ***Cannabis sativa***

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PLATE B: some ethnomedicinal pants used for PHC

7. ***Melia azedarach*** **8.** ***Bombax ceiba*** **9.** ***Myrica esculenta*** **10.** ***Berberis aristata*** **11.** ***Citrus sinensis*** **12.** ***Mentha piperita***

Table1: List of Medicinal Plant Used by Indigenous Community of Dev-Prayag block for Health and Wellness

Botanical name	Local name	Family	Habit	Parts used	Ethnomedicinal uses in Different Human Ailments
Abutilon indicum (L.) Sweet	Kanghi	Malvaceae	Shrub	Leaves, Root	Cough, Fever, Diarrhoea, Dysentery, Wound healing, Rheumatism
Aegle marmelos (L.) Corr.	Bel	Rutaceae	Tree	Leaves, Fruit	Mouth sores, Constipation, Cold, Control blood sugar level, Diarrhoea, Dysentery
Aesculus indica Hook	Kanor	Hippocastanaceae	Tree	Seed, Bark	Rheumatism, Joint pain, Piles
Agave americana L.	Patavaar	Asparagaceae	Herb	Leaves, Root	Boils, Wound filling
Ageratina adenophora (Spreng.) R.M. King & H. Rob.	Basya	Asteraceae	Shrub	Leaves, Stem	Cuts, Wound healing, Fever, Pimple and Acne
Ageratum conyzoids L.	Neela phulnu	Asteraceae	Herb	Leaves	Wound healing, Skin burn
Ajuga parviflora Benth	Neelkanthi	Lamiaceae	Herb	Whole plant	Stomach Pain, Diabetes,
Allium cepa L.	Piyaz	Amaryllidaceae	Herb	Bulb	Toothache, Dysentery, Fever, Indigestion, Skin burn and Dandruff
Allium sativum L.	Lahasun	Amaryllidaceae	Herb	Bulb	Tooth infection,
Aloe barbadensis Mill.	Aloe vera	Asphodelaceae	Shrub	Leaves	Gum inflammation, Burn, Wound healing, Constipation, Glowing skin
Anogeissus latifolia (Roxb. ex. DC.) Wall. ex. Bedd.	Dhauda	Combretaceae	Tree	Bark, Leaves	Joint pain, Diarrhoea, Dysentery, Gum disease
*Asperagus adscendene R*oxb.	Jhirna	Asparagaceae	Herb	Stem	Skin burn, Moisturizer
Azadirachta indica A. Juss.	Neem	Meliaceae	Tree	Twigs, Leaves	Toothache, Gum diseases, Skin, Fever, Diabetes
Barleria cristata L.	Marchunda	Acanthaceae	Shrub	Root, Leaves, Bark	Toothaches, Fever, Cough,
Berberis aristata DC.	Kingod	Berberidaceae	Shrub	Root	Diabetes, Jaundice, Discoloration of skin
Betula utilis D.Don	Bhojpatra	Betulaceae	Tree	Bark, Stem	Wound healing,
Boehmeria rugulosa Wedd	Genthi	Urticaceae	Shrub	Leaves, Stem	Wound healing, Cuts, Fever, Diarrhoea
Bombax ceiba L.	Seemal	Bombacaceae	Tree	Bark, Leaves, Flower	Wound healing, Leucorrhoea, Urinary problems
Calendula officinalis L.	Genda	Asteraceae	Herb	Flower	Wound healing, anti-inflammatory, acne, Reducing hyperpigmentation
Callicarpa macrophylla Vahl	Daiya	Lamiaceae	Shrub	Leaves, Root	Mouth ulcer, Pain
Calotropis procera (L.) R. Br.	Aak	Apocynaceae	Shrub	Latex, Leaves	Fever, Leprosy, Eczema

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Cannabis sativa L.	Bhang	Cannabaceae	Herb	Leaves	Pain relief, Wound and cuts healing
Carissa carandas L.	Karonda	Apocynaceae	Shrub	Leaves, Fruit	Toothache, Gum problems, Wounds healing, Diabetes,
Centella asiatica (L.) Urban	Brahmi	Apiaceae	Herb	Whole plant	Constipation, Leucorrhoea, Jaundice, Diarrhoea, Dysentery, Anti-inflammatory, Fractures
Citrus sinensis (L.) Osbeck	Santra, Malta	Rutaceae	Tree	Fruit	Constipation, Bloating, Face glow
Cucumis sativa L.	Kakdi	Cucurbitaceae	Climber	Fruit, Seed	Fever, Burns, Constipation, Kidney stone
Curcuma longa L.	Haldi	Zingiberaceae	Herb	Rhizome	Oral infections, Gum problems, Glowing skin, Acne, Pimple, Ulcer, Mestrual disorder
Cynodon dactylon (L.) Pers.	Doob	Poaceae	Herb	Leaves	Burn, Eczema, Indigestion
Datura stramonium L.	Dhatura	Solanaceae	Herb	Leaves, Seed	Gastrointestinal ailments, Urinary tract, Cough
Dianthus caryophyllus L.	Karnashan	Caryophyllaceae	Herb	Flower	Swelling, Diabetes, Piles,
Dioscorea bulbifera L.	Banalu	Dioscoreaceae	Herb	Tuber	Cuts healing, Goitre
Eclipta alba (L.) Hassk.	Bhringraj	Asteraceae	Herb	Whole plant	Anti-inflammatory, fever, Cough, Wound healing, Leprosy, Jaundice, Ulcer, Hair blackening, Hyperpigmentation
Emblica officinalis Gaertn.	Amla	Phyllanthaceae	Tree	Fruit	Diabetes, Dandruff, Skin ailments
Euphorbia royleana Boissier	Sullu	Euphorbiaceae	Shrub	Latex	Join fractured bone, Constipation, Toothaches, Leprosy
Evolulus alsidoides L.	Shankshpushpi	Convolvulaceae	Herb	Whole Plant	Respiratory ailments, Fever
Ficus auriculata Lour.	Timla	Moraceae	Tree	Leaves	Mouth ulcers, Wound healing
Ficus benghalensis L.	Bargad	Moraceae	Tree	Aerial roots, Bark, Root, Buds	Tooth decay, Diarrhoea, Dysentery, Diabetes, Ulcer, Leprosy
Ficus carica L.	Fedu	Moraceae	Tree	Fruit, Latex	Tooth abscess, Cough, Insects bites
Ficus racemosa L.	Gular	Moraceae	Tree	Bark, Latex, Root, Fruit	Dental caries, Burns, Dysentery, Diabetes
Ficus religiosa L.	Peepal	Moraceae	Tree	Bark, Fruit, Seed	Gum problems, Swelling, Burns
Flacourtia indica (Burm.f.) Merill	Bilangara	Flacourtiaceae	Shrub	Root, Leaves	Constipation, Scabies, Jaundice, Insects bite

Grewia optiva J.R.Drumn. ex Burret	Bhimal	Malvaceae	Tree	Bark, Fruit	Shampoo to treat dandruff, Cough, Ulcer
Hedychium spicatum Ham. Ex Sm.	Van Haldi	Zingerberaceae	Herb	Rhizome	Snake bite, Joint Pain, Fever
Holarrhena antidysenterica Wall. ex G.Don	Indrajau	Verbenaceae	Tree	Leaves, Bark	Scabies, Dysentery
Ipomoea digitata L.	Vidarikand	Convolvulaceae	Climber	Tubers	Menstrual disorder, Constipation
Jatropha curcas L.	Arand	Euphorbiaceae	Shrub	Leaves, Seed	Toothache, Skin ailments
Juniperus communis L.	Hapsa	Cupressaceae	Shrub	Bark, Leaves, Ripe berries	Leucorrhoea, Kidney problems
Lantana camara L.	Laltain	Verbenaceae	Shrub	Whole plant	Dysentery, Fever, Piles, Eczema
Lister glutinosa (Lour) C.B. Rob.	Jhingan	Lauraceae	Tree	Bark and Gum	Join fractured bone, Oral ulcers
Lycopersicon esculentum Mill.	Tamater	Solanaceae	Herb	Fruit	Acne, Anti-aging skin, Liver ailments
Mallotus philippensis (Lam.) Mull.-Arg.	Ruina	Euphorbiaceae	Tree	Fruit	Pain relief, Ringworms, Animal bites, Constipation
Mangifera indica L.	Aam	Anacardiaceae	Tree	Leaves, Bark, Root,	Gum diseases, Leucorrhoea, Ulcer
Melia azedarach L.	Bakain	Meliaceae	Tree	Leaves	Toothache, Gum problems, Eczema, Scabies, Vaginal infection
Mentha piperita L.	Pudina	Lamiaceae	Herb	Leaves	Bad breath
Metha longifolia (L.) Huds.	Pudina	Lamiaceae	Herb	Leaves	Rheumatism, Treat acne, Dandruff
Moringa oleifera Lam.	Sahajn	Moringaceae	Tree	Leaves, Flower, Root	Rheumatism, Snake bite, Fever
Murraya koenigii L.Spreng	Karipatta	Rutaceae	Shrub	Leaves	Itching, Bites of Animals,
Musa paradisiaca L.	Kela	Musaceae	Herb	Fruit, Leaves, Root	Scabies, Leprosy, Diabetes, Acidity
Myrica esculenta Bach.Ham. ex D.Don	Kafal	Myricaceae	Tree	Fruit	Skin allergies, Headache
Nyctanthes arbortristis L.	Harsinger	Oleaceae	Shrub	Leaves, Flower, Seed	Arthritis, Bleeding gums, Constipation, Cough
Oryza sativa L.	Chawal	Poaceae	Herb	Seeds	Face scrubber for sun burn,
Oxalis corniculata L.	Bhilmoru	Oxildaceae	Herb	Whole plant	Burn, Diarrhoea, Dysentery,
Picea smithiana Stewart ex Brandis	Rai	Pinaceae	Tree	Resin, Galls	Cough, Fever, Asthma
Pistacia integerrima Stewart ex Brandis	Cacrasinghi	Anacardiaceae	Tree	Leaves, Galls	Asthma, Fever, Dental pain
Prunus cerasoides Buch. Ham ex D.Don	Paiyaan	Rosaceae	Tree	Bark	Leprosy, Skin burn, Asthma
Prunus domestica L.	Pulm	Rosaceae	Tree	Bark, Seed	Wounds healing, Skin discoloration, Fever
Psidium guajava L.	Amrud	Myrtaceae	Tree	Leaves	Toothache, Gum problems, Indigestion, Painful menstruation
Rhus parviflora Roxb	Tungala	Anacadiaceae	Shrub	Leaves, Bark	Dysentery, Cleaning teeth

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Ricinus communis L.	Castor	Euphorbiaceae	Tree	Leaves, Root	Toothache, Boils
Rosa ribiginosa L.	Gulab	Rosaceae	Shrub	Petals	Acne, Eczema,
Rubus occidentails L.	Kala hisalu	Rosaceae	Shrub	Fruit	Mouth ulcer, Menstrual cramps, Blood sugar control
Rumex dentatus L.	Emada	Polygonaceae	Herb	Leaves, Root	Stomach pain
Rumex hastatus D.Don	Amedu	Polygonaceae	Shrub	Whole parts	Cuts, Wounds, Burn
Rumex nepalensis Spreng.	Jangali Palak	Polygonaceae	Herb	Root	Dysentery, Bleeding gums
Salinum vaginatum C.B Clarke.	Bhutkesh	Apiaceae	Herb	Root	High blood pressure,
Sapindus mukorossi Gaertn.	Reetha	Sapindaceae	Tree	Fruit	Dandruff, Acne, Blood purification, Fever, Intestinal worms, Arthritis
Saussurea costus (Falc.) Lipsch	Kuth	Asteraceae	Herb	Root	Indigestion, Cough, Pain, Jaundice
Solanum incanum L.	Bhukandari	Solanaceae	Shrub	Fruit, Leaves, Root	Jaundice, Constipation, Malaria, Fever, Ringworms, Asthma
Solanum nigrum L.	Makai	Solanaceae	Herb	Leaves	Dermatitis, Fever, Joint pain
Terminalia bellirica (Gaertn.) Roxb	Baheda	Combretaceae	Tree	Bark, Fruit	Cough, Leucoderma, Ulcer
Tinospora cordifolia (Wild). Miers	Giloy	Menispermaceae	Climber	Stem, Root	Snake bite, Jaundice, Burn, Anaemia, Gout
Tribulus terrestris L.	Gokhru	Oxalidaceae	Herb	Seed, Leaves	Kidney problems, Skin infection, Cough, Pain relief
Urtica dioica L.	Kandali	Urticaceae	Herb	Root, Leaves	Blood purification, Anaemia, Headache, Jaundice
Viola canescens Wallich	Sumaya	Violaceae	Herb	Leaves	Face cleaning
Viola odorata Linn.	Banafsha	Violaceae	Herb	Flower, Leaves	Cough, Fever
Zanthoxylum armatum DC.	Timur	Rutaceae	Tree	Young stem, Fruit	Toothache, Gum problems, Gout, Diabetes
Zingiber officinale Rosc	Aadu	Zingiberaceae	Herb	Rhizome	Toothache, Mouth sores

Conclusion

The study reveals that ethnic community of Devprayag block finds ethnomedicinal practices fruitful, easily available, cost-effective, and with minimal side effects and relies on medicinal plants for primary healthcare and well-being. The therapeutic uses of plants underscore the importance of preserving plant diversity. The overuse of medicinal plants can lead to their depletion and threaten their sustainability. So, proper conservation measures are necessary to ensure the long-term availability of these plants. Implementing sustainable harvesting practices and educating the community about the importance of conservation and sustainable use can help in ensuring the long-term availability of medicinal plants.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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