

Research Article

Biodiversity and Indigenous Uses of Medicinal Plant in the Chandra Prabha Wildlife Sanctuary, Chandauli District, Uttar Pradesh

Maurya Santosh Kumar,¹ Seth Ankit,¹ Dev Nath Singh Gautam,¹ and Singh Anil Kumar²

¹Ayurvedic Pharmacy Laboratory, Banaras Hindu University, Rajiv Gandhi South Campus, Barkachha, Mirzapur 2310012, India

²Department of Dravyaguna, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi 221005, India

Correspondence should be addressed to Maurya Santosh Kumar; dravyapharma@gmail.com

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Conventional medicines are very important part of Indian culture. In this study the outcome of two-year study of ethnomedicinal uses of plants in Chandra Prabha Wildlife Sanctuary (CPWLS) and nearby area is reported. Information related to different plants which are used by local community in the treatment of many common diseases and well-being in the area was collected. Data on the use of medicinal plants were collected using structured interview of about 122 participants and thorough observations and conversations with local communities. Approximately 100 plants belonging to 43 families used by the local healers were reported in this study. The plant species with the highest fidelity level (Fl) were *Holarrhena antidysenterica*, *Lawsonia inermis*, *Gymnema sylvestre*, *Dalbergia sissoo*, *Cassia fistula* Linn., *Butea monosperma* (Lam.) Kuntze., *Boerhaavia diffusa* Linn., *Albizia lebbek* Benth., *Aegle marmelos* Correa., *Sphaeranthus indicus* Linn., and *Solanum surattense* Burm. f. The most frequent ailments reported were hepatitis, jaundice, constipation, and skin and urinary problems. The parts of the plants most frequently used were fruit, roots, and whole plants (17%) followed by leaves (16%) and bark (15%). This study presents new research efforts and perspectives on the search for new drugs based on local uses of medicinal plants.

1. Introduction

Plants are always considered as a primary source of drugs in traditional and alternative system of medicine in various forms such as crude form, juice, decoction, and crude extracts. About 80% people of the world, particularly in the rural areas of developing countries, continue using traditional resources in healthcare [1]. Indian subcontinent is renowned for its cultural and plant biodiversity where large numbers of people are still living in tribes. These tribal people possess a pool of undisclosed, ethnomedicinal, and ethnopharmacological information regarding the flora of their surroundings, which may prove to be very helpful in rural community with its advantage. Natural wealth as well as the undisclosed ethnopharmacological information and the tribal cultures have been decreased remarkably at a disturbing rate due to change in life style, unintentional developmental programs, and mounting recent civilization. Negligence by the youth

also influences the traditional knowledge [2, 3]. Therefore, it is necessary to discover and document this exceptional, original, and conventional information of the ethnic population, before it disappears with the knowledgeable persons. It is also for the establishment of these conventional principles at the national and international level realizing the recent global trends [4]. There is inadequate data on ethnomedicinal uses of plant in eastern Uttar Pradesh [1, 5–8] as compared to northern and western Uttar Pradesh [9–14]. Further, ethnobotanical survey centered on Purvanchal region of eastern Uttar Pradesh is enormously deficient [15–18]. Some of the reported surveys are available for potential effectiveness of the traditional healthcare practices, alive in native and local communities nearby wildlife sanctuaries [19–24]. Chandra Prabha Wildlife Sanctuary previously has rich forest wealth and traditional knowledge, but, after disappearance of Asiatic Lion, people from nearby utilized the forest for their livelihood as well as medicinal requirements. These people



FIGURE 1: Area of study.

explore the medicinal prosperity of the area. Therefore, the present study was proposed to document the ethnomedicinal information of Chandra Prabha Wildlife Sanctuary (CPWLS) and nearby area.

2. Aim and Objectives

The primary aim of this research work was to assess the richness of ethnomedicinal plant species used by the local tribes in forest areas and to provide an initial picture of the ethnomedicinal plants in the CPWLS, which was not studied before from this viewpoint. So the present study was planned keeping in view the following goals:

- (1) assessing the diversity, distribution, and utilization patterns of medicinal plants;
- (2) identification and documentation of plant species used for the treatment and prevention of various diseases and ailments in the study area.

3. Study Area

The Chandauli district contributes to the Indian GDP by providing a range of cereals including paddy and wheat. It is popularly known as the “Dhaan Ka Katora of Uttar Pradesh” because of tremendous productive lands of the Gangetic Plain. The Sanctuary is situated in Chandauli district, in the south eastern division of Uttar Pradesh, between Chakia and Naugarh, having rich vegetation spread over an area of 78 square kilometers and lying between the latitude $24^{\circ}54'43''\text{N}$ and longitude $83^{\circ}10'41''\text{E}$ about 70 Km from the famous city of Varanasi (Figure 1). The place has been gifted with attractive picnic spots, intense forest, and beautiful waterfalls

like Rajdari and Devdari and a dam nearby area known as Chandra Prabha Dam. The Sanctuary was recognized in 1957 and spread in more than 9,600 hect. The center area of the place covers over 2,686 hect. It was famous for the Asiatic Lion during 1957–1970. It provides a natural and ideal habitat for grasslands, many caves in Vindhya region, and waterfalls for a crowd of animals and plants. There is an enormous possibility for tourism development in the Sanctuary where people can take pleasure in natural attractiveness and biodiversity. There is broad range of lovely colorful birds and creeping animals (poisonous and nonpoisonous) in the sanctuary. Rajdari and Devdari are two main waterfalls in this area which is enclosed by the forest area. The height of Rajdari is more than 65 meters which is a stepped waterfall and a major spot of attraction for the tourists. Devdari is about 500 m downwards the watercourse underneath Rajdari waterfall. The temperature in the region varies from 38°C (summer) to 14°C (winter). Rainy season lasts from mid of June to September. The forest had been the main resource for natives, but their dependence on forest resources continued to decrease gradually due to deforestation. The Sanctuary is typically dry deciduous forest and also has a huge diversity of natural shrubbery.

During the course of exploration of ethnomedicinal plants the information has been gathered from the healers inhabiting the forest areas who have sound knowledge of herbal remedies. For many decades, the tribal community has a traditionally self-managed system of folk medicine and primary healthcare mainly based on herbal remedies.

4. Methodology

The survey was spread across the seasons during 2012–2013 to get maximum information following the typical protocols for the collection of ethnobotanical facts [25–27]. The study was undertaken by carrying out ethnobotanical survey with the people living in the area under study. The aims and objectives of the research were first explained to the local employees of the Sanctuary and consulted for the recognition of knowledgeable persons (informants). These informants frequently recommended other potential informants. Few traditional healers and some religious leaders such as temple priests who are involved in the practice and prescription of medicinal plants were also interviewed. We attempted to interview peoples from all age groups (Table 1), sex, and socioeconomic and ethnic community so that informants include legislature of the entire community. Total 122 informants in the age group of 17–70 years were identified from CPWLS and surrounding areas. Out of the various informants there were 8 traditional healers and 7 temple priests. The data was gathered involving a planned survey utilizing questionnaire with literate people and interview with the rest in local language by using interpreters.

Local name of plants, taxonomic diversity, parts of the plant used, indication, method and forms of preparation, and route of administration were recorded and documented by successive visit to villages (Table 2). Status in the humanity concerning their familiarity about herbs and traditional uses are the basic criteria for the selection for the interview

TABLE 1: Informants.

| Variables | Frequency | % |
|--------------|-----------|-------|
| Gender | | |
| Male | 79 | 64.75 |
| Female | 43 | 40.16 |
| Age in years | | |
| ≤20 | 5 | 4.10 |
| 20–30 | 21 | 17.21 |
| 31–40 | 31 | 25.41 |
| 41–50 | 52 | 42.62 |
| 51–60 | 6 | 4.92 |
| ≥60 | 7 | 5.74 |

of informant. The collected data from these informants represent the whole community, because they are recognized healers, villagers, elder people, teachers, social workers, and so forth.

5. Identification of Plants

Prior to survey, a questionnaire was designed and pretested with five informants. Processing of voucher specimens for herbarium preparation was done following standard procedures [28]. The photographs of the plants were taken at their locality. Identification was carried out with the help of available floras [29–31] and by the professional experts. Plant names were checked according to the International Plant Name Index [32].

6. Results and Discussion

A discussion of human being existence on this planet would not be complete without a look at the role of plants, because plants have been an integral part of human culture since the start of civilization. Ethnobotany is the learning of different methods by which communities of a particular province utilize native plants for their daily routine works, diet, outfits, medication, and other activities [33]. For the protection and consumption of natural wealth its documentation is required [34]. Several ethnobotanical studies were carried out to take record of the species used by the residents contiguous in the different area for health care. It is believed that there are still undisclosed species of plants in the rainforests and these species must be identified and explored for their undiscovered potentials and biological activities. Traditional medicine is practical application of the local therapeutically important plants as well as minerals. With every specialist that dies without an apprentice, the great medical knowledge base of their culture dies with them. Documentation of this undisclosed and traditional information is very much helpful in understanding the biodiversity [35], making of policies for conservation of medicinal plants [36], and also the development of researches.

The documented medicinal plants and all relevant data of the present study are summarized in Table 2. Altogether 100 medicinal plants belonging to 43 families and 82 genera were documented from the study area (Table 2). Fabaceae (11%),

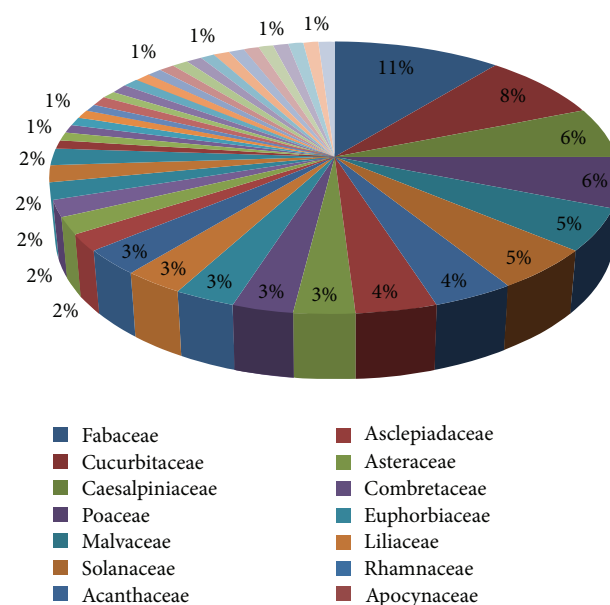


FIGURE 2: Distribution of families.

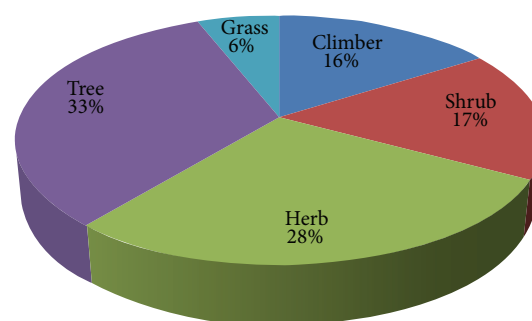


FIGURE 3: Distribution of habit.

Cucurbitaceae (8%), Caesalpiniaceae and Poaceae (6%), and Malvaceae and Solanaceae (5%) were the dominant families (Figure 2). Among the genera, *Cassia* (6 spp.), *Ziziphus*, *Trichosanthes*, *Terminalia*, *Solanum*, *Sida*, and *Luffa* (3 spp. each) and *Calotropis*, *Desmodium*, and *Eclipta* (2 spp. each) were dominant genera. Medicinal value of plants of Vindhya region belonging to Fabaceae family was previously reported by Chaudhary [37].

Among the 100 recognized medicinal plants, 33% are trees. Other species used belong to herbs (28%), followed by shrubs (17%), vine/climber (16%), and grass (6%) (Figure 3). Some of the plants are also available in residential area, estate, wayside, riversides, and the tropical forest. Availability of trees and herbs is common in the forest. Therefore, it is easy for the local healers to use these plants [38].

The common sicknesses for the people living in tribes in the study area are bronchitis, constipation diarrhea, dysentery, gastric troubles, cuts, wounds, urinary problems, jaundice, and so forth. Amongst the parts used, fruit, roots, and whole plants (17%) followed by leaves (16%) and bark (15%) were the major parts (Figure 4). Exact doses and duration of treatment are considered as intellectual property

TABLE 2: Name of medicinal plants with detailed description used by the Chandra Prabha Wildlife Sanctuary, Chandauli, Uttar Pradesh, India.

| Serial number | Plant name | Local name | Family | Habit | Part used | Preparation | Route of administration | Ailments / uses |
|---------------|--|------------|------------------|-------|---------------|-------------|-------------------------|---|
| 1 | <i>Abutilon indicum</i> (Linn.) Sweet (DD001) | Kanghi | Malvaceae | [Sh] | [RT] | [D] | [O] | Diuretic |
| 2 | <i>Acacia catechu</i> Willd. (DD002) | Khadir | Caesalpinaceae | [T] | [Br] | [D] | [O] | Jaundice |
| 3 | <i>Adhatoda vasica</i> Nees. (DD003) | Adusha | Acanthaceae | [Sh] | [Lf], [Fl] | [D] | [O] | Chronic bronchitis, asthma, and antispasmodic |
| 4 | <i>Aegle marmelos</i> Correa. (DD004) | Bael | Rutaceae | [T] | [Rt Br], [Br] | [D], [RW] | [O] | Diuretic, jaundice |
| 5 | <i>Ailanthus excelsa</i> Roxb. (DD005) | Mahanimba | Simaroubaceae | [T] | [Br] | [D] | [O] | Febrifuge, laxative, hepatitis, bronchitis, constipation, and antitoxic in rat bite |
| 6 | <i>Albizia lebeck</i> Benth. (DD006) | Shirisha | Caesalpinaceae | [T] | [Br] | [D] | [O] | Antitoxic and antiallergic |
| 7 | <i>Aloe vera</i> Tourn. ex Linn. (DD007) | Kumari | Liliaceae | [Sh] | [Lf] | [J], [Pt] | [O], [LA] | Hepatoprotective and anti-inflammatory |
| 8 | <i>Alstonia scholaris</i> R. Br. (DD008)* | Sataparna | Apocynaceae | [T] | [Br] | [D] | [O] | Febrifuge, skin diseases, purgative, tumours suppressor |
| 9 | <i>Amaranthus spinosus</i> Linn. (DD009) | Cholai | Amaranthaceae | [H] | [WP] | [D] | [O] | Boils, burns, snakebite, skin diseases, laxative, eruptive fevers |
| 10 | <i>Amorphophallus campanulatus</i> Bl. ex Decne. (DD010) | Surana | Araceae | [H] | [Rh] | [RW], [Pw] | [O] | Laxative, digestive disorders, piles, skin disorders, and aphrodisiac |
| 11 | <i>Andrographis paniculata</i> Nees. (DD011) | Kalmegha | Acanthaceae | [H] | [WP] | [D] | [O] | Fever, malaria, amoebic dysentery, dyspepsia |
| 12 | <i>Andropogon invaraneusa</i> Jones. (DD012) | Khas | Poaceae | [Gr] | [Lf], [RT] | [D] | [O] | Fever, diuretic, viral fevers |
| 13 | <i>Aristolochia indica</i> Linn. (DD013) | Isharmul | Aristolochiaceae | [Cl] | [Lf] | [J], [D] | [O], [LA] | Antitoxic and jaundice |
| 14 | <i>Artocarpus heterophyllus</i> Lamk. (DD014) | Katahala | Liliaceae | [T] | [Lf] | [Pt] | [LA] | Fever, boils, wounds, and skin diseases |
| 15 | <i>Asparagus racemosus</i> Willd. (DD015) | Shatavari | Liliaceae | [H] | [Rh] | [Pw], [D] | [O] | Diuretic, anti-inflammatory |
| 16 | <i>Asteracantha longifolia</i> Nees. (DD016)* | Talmakhana | Acanthaceae | [H] | [WP] | [D] | [O] | Diuretic |
| 17 | <i>Hygrophila auriculata</i> (DD016)* | Neem | Meliaceae | [T] | [Lf] | [D] | [O] | Viral hepatitis |
| 18 | <i>Azadirachta indica</i> A. Juss. (DD017) | Bans | Poaceae | [H] | [Lf], [St] | [D] | [O] | Hepatitis, jaundice |
| 19 | <i>Bamboo manna</i> (DD018) | Vajradanti | Acanthaceae | [Sh] | [WP] | [D] | [O] | Laxative, hemorrhoids, cirrhosis of liver, varicose veins, and jaundice |
| 20 | <i>Barleria prionitis</i> Linn. (DD019) | Hijjala | Lecythidaceae | [T] | [Fr] | [D], [RW] | [O] | Snake bite |
| 21 | <i>Barringtonia acutangula</i> (Linn.) Gaertn. (DD020) | Petha | Cucurbitaceae | [Cl] | [Fr] | [J], [RW] | [O] | Jaundice |
| 22 | <i>Benincasa hispida</i> (Thunb.) Cogn. (DD021) | Gadahpurna | Nyctaginaceae | [Cl] | [RT] | [D] | [O] | Diuretic |

TABLE 2: Continued.

| Serial number | Plant name | Local name | Family | Habit | Part used | Preparation | Route of administration | Ailments /uses |
|---------------|---|-------------|----------------|-------|------------|-------------|-------------------------|---|
| 23 | <i>Butea monosperma</i> (Lam.) Kuntze. (DD023) | Dhak | Fabaceae | [T] | [Br] | [D] | [O] | Enlargement of liver in hepatitis |
| 24 | <i>Calotropis gigantea</i> (Linn.) R. Br. ex Ait. (DD024) | Madar | Asclepiadaceae | [Sh] | [Lt], [Lf] | [D], [RW] | [O] | Hepatitis, counterirritant, laxative, and syphilitic affection |
| 25 | <i>Calotropis procera</i> (Ait.) R. Br. (DD025) | Madar | Asclepiadaceae | [Sh] | [Lt], [Lf] | [D], [RW] | [O] | Similar to <i>C. gigantea</i> |
| 26 | <i>Capparis decidua</i> Edgew. (DD026) | Kair | Capparidaceae | [Sh] | [Br] | [D] | [O] | Purgative and hepatitis |
| 27 | <i>Capsicum frutescens</i> L. (DD027) | Mirch | Solanaceae | [Sh] | [Fr] | [Pt], [RW] | [O], [LA] | Skin itches; the fruit is used to treat discomforts and common ailments associated with pregnancy |
| 28 | <i>Carica papaya</i> L. (DD028) | Papita | Caricaceae | [T] | [Fr], [Lf] | [RW] | [O] | Digestant, anthelmintic, laxative, tonic, nutritive, aphrodisiac, wormicidal activity, cough, and diuretic properties |
| 29 | <i>Cassia alata</i> L. (DD029) | Dadmari | Fabaceae | [H] | [Lf] | [Pt] | [LA] | Ringworm and scabies, stomach-aches, laxative effect |
| 30 | <i>Cassia fistula</i> Linn. (DD030) | Amaltas | Caesalpinaceae | [T] | [FrP] | [Pw] | [O] | Laxative, hepatitis |
| 31 | <i>Cassia occidentalis</i> Linn. (DD031) | Kasamarda | Caesalpinaceae | [Sh] | [SD], [Lf] | [Pw] | [O] | Laxative, cough |
| 32 | <i>Cassia tora</i> Linn. (DD032) | Chakramarda | Caesalpinaceae | [H] | [SD] | [Pw] | [O] | Digestive upsets |
| 33 | <i>Cissampelos pareira</i> Linn. (DD033) | Bichhukand | Menispermaceae | [Cl] | [RT] | [D] | [O] | Hepatitis, antitoxic, correcting the digestive system |
| 34 | <i>Clerodendrum philomidis</i> Linn. f. (DD034) | Tarkari | Verbenaceae | [T] | [Br] | [D] | [O] | Antibacterial and anti-inflammatory |
| 35 | <i>Crataeva nurvala</i> Buch. Ham. (DD035) | Varuna | Capparidaceae | [T] | [Br] | [D] | [O] | Laxative, diuretic, anti-inflammatory, and antitoxic |
| 36 | <i>Curculigo orchiooides</i> Gaertn. (DD036) | Safed musli | Hypoxidaceae | [H] | [RT] | [D] | [O] | Jaundice, antibacterial, antifungal, and leucorrhoea |
| 37 | <i>Cynodon dactylon</i> (Linn.) Pers. (DD037) | Doob | Poaceae | [Gr] | [WP] | [D] | [O] | Ascites, general anasarca, antiviral agent, and chicken pox |
| 38 | <i>Cyperus rotundus</i> Linn. (DD038)* | Motha | Cyperaceae | [Gr] | [RT] | [D] | [O] | Scariosus, amoebic dysentery, anti-inflammatory, antibacterial |
| 39 | <i>Dalbergia sissoo</i> Roxb. (DD039) | Shisham | Fabaceae | [T] | [HtW] | [D] | [O] | Chronic fevers, diuretic, antibacterial, used for repair of damage of the tissues |
| 40 | <i>Desmodium gangeticum</i> DC. (DD040) | Sharivan | Fabaceae | [H] | [WP] | [D] | [O] | Diuretic, antitoxic, vomiting, and diarrhoea |
| 41 | <i>Desmodium triflorum</i> DC. (DD041) | Teenpatti | Fabaceae | [H] | [WP] | [D] | [O] | Laxative, diuretic, and carminative |
| 42 | <i>Desmostachya bipinnata</i> Stapf. (DD042)* | Kusha | Poaceae | [Gr] | [RT] | [D] | [O] | Stopping bleeding, anti-inflammatory, antitoxic, and diuretic, and correcting the tissues |

TABLE 2: Continued.

| Serial number | Plant name | Local name | Family | Habit | Part used | Preparation | Route of administration | Ailments /uses |
|---------------|---|------------|-----------------|-------|------------|-------------|-------------------------|---|
| 43 | <i>Diospyros peregrina</i> (Gaertn.) Gurke. (DD043) | Tendu | Ebenaceae | [T] | [Fr], [Br] | [D], [RW] | [O] | Rheumatism and ulcers |
| 44 | <i>Dolichos biflorus</i> Linn. (DD044) | Kulathi | Fabaceae | [Cl] | [SD] | [Pw] | [O] | Diuretic, jaundice, and gall stones |
| 45 | <i>Eclipta alba</i> (Linn.) Hassk. (DD045)* | Bhingaraja | Asteraceae | [H] | [WP] | [D] | [O] | Anaemia, jaundice, laxative and stimulant, diuretic, emetic, and stimulant of bone marrow |
| 46 | <i>Eclipta prostrata</i> Linn. (DD046) | Bhringraj | Asteraceae | [H] | [WP] | [D] | [O] | Anaemia, jaundice, laxative and stimulant, diuretic, emetic, and stimulant of bone marrow |
| 47 | <i>Embllica officinalis</i> Gaertn. (DD047) | Amala | Euphorbiaceae | [T] | [Fr] | [D], [RW] | [O] | Metabolic disorders, laxative, rejuvenation, and hepatitis |
| 48 | <i>Eucalyptus globulus</i> Labill. (DD048) | Safeda | Myrtaceae | [T] | [Lf], [RT] | Oil, [D] | [O], inhalation | Antiseptic, upper respiratory tract infection, skin diseases, and purgative |
| 49 | <i>Ficus racemosa</i> Linn. (DD049) | Gular | Moraceae | [T] | [Br] | [D] | [O] | Hepatitis |
| 50 | <i>Gmelina arborea</i> Roxb. (DD050) | Gambhari | Verbenaceae | [T] | [Br] | [D] | [O] | Laxative, antitoxic, diuretic, and healing |
| 51 | <i>Gymnema sylvestre</i> Schult. (DD051) | Gudmar | Asclepiadaceae; | [Cl] | [RT] | [D] | [O] | Rheumatism, cough, dyspnoea, ulcers, and eye pains |
| 52 | <i>Hemidesmus indicus</i> R. Br. (DD052) | Anantamul | Asclepiadaceae | [Cl] | [RT] | [D] | [O] | Jaundice and antitoxic |
| 53 | <i>Hibiscus rosa-sinensis</i> L. (DD053) | Gurhal | Malvaceae | [Sh] | Sap, [Lf] | [D], [Pt] | [O], [LA] | Boils and sprains, asthma, wounds, and swelling |
| 54 | <i>Holarrhena antidysenterica</i> (Linn.) Wall. (DD054) | Indrajau | Apocynaceae | [T] | [Br] | [D] | [O] | Antibacterial, amoebic dysentery, laxative, and jaundice |
| 55 | <i>Indigofera tinctoria</i> Linn. (DD055) | Neel | Fabaceae | [H] | [WP] | [D] | [O] | Purgative, diuretic, antitoxic, used in epilepsy, nervous disorders, dysuria, hepatitis |
| 56 | <i>Ipomoea digitata</i> Linn. (DD056) | Vidari | Convolvulaceae | [H] | [RT] | [D] | [O] | Laxative, stimulant, anti-inflammatory |
| 57 | <i>Jasminum officinale</i> f. affine (DD057) | Chameli | Oleaceae | [Sh] | [Lf] | [D], [RW] | [O] | Antitoxic and antibacterial |
| 58 | <i>Jatropha curcas</i> Linn. (DD058) | Ratanjot | Euphorbiaceae | [T] | Oil, [Lf] | Oil | [LA] | Purgative, eczema, herpes, itch, sores, bleeding wounds, piles, scabies, ringworm, and decaying teeth |
| 59 | <i>Juniperus communis</i> Linn. (DD059)* | Kaiphall | Cupressaceae | [Sh] | [Fr] | [D], [RW] | [O] | Diuretic, antibacterial, gonorrhoea, dropsy, anti-inflammatory, and antimicrobial |
| 60 | <i>Lawsonia inermis</i> Linn. (DD060) | Mehndi | Lythraceae | [Sh] | [Lf][Br] | [D], [Pt] | [O], [LA] | Jaundice, epilepsy, and asthma, reducing burning, small pox, anti-inflammatory, and gonorrhoea |
| 61 | <i>Luffa acutangula</i> (Linn.) Roxb. (DD061) | Turai | Cucurbitaceae | [Cl] | [Fl], [Fr] | [D], snuff | [O], nasal | Laxative, diuretic, purgative jaundice |

TABLE 2: Continued.

| Serial number | Plant name | Local name | Family | Habit | Part used | Preparation | Route of administration | Ailments /uses |
|---------------|--|--------------------|---------------|-------|------------------|-------------|-------------------------|--|
| 62 | <i>Luffia cylindrica</i> (Linn.) M. J. Roem. (DD062) | Ghiatarui | Cucurbitaceae | [Cl] | [WP], [Fr] | [D] | [O] | Laxative, diuretic |
| 63 | <i>Luffia echinata</i> Roxb. (DD063) | Bindal | Cucurbitaceae | [Cl] | [WP], [Fr] | [D] | [O] | Purgative, diuretic, and anti-inflammatory |
| 64 | <i>Momordica charantia</i> Linn. (DD064) | Karela | Cucurbitaceae | [Cl] | [Fr] | [RW] | [O] | Hepatitis, laxative |
| 65 | <i>Moringa oleifera</i> Lam. (DD065) | Sahijana | Moringaceae | [T] | [Fr], [Br] | [D], [RW] | [O] | Anti-inflammatory, healing, diuretic, laxative, antipyretic, antirheumatic, tonic, diuretic, cholagogic |
| 66 | <i>Musa paradisiaca</i> Linn. (DD066) | Kela | Musaceae | [Sh] | [Fr], [Lt] | [RW] | [O] | Laxative, used to alter secretion tumours, blocked vessels |
| 67 | <i>Nyctanthes arbor-tristis</i> Linn. (DD067) | Harsingar | Oleaceae | [T] | [Lf] | [D] | [O] | Diabetes, laxative, diuretic cholagogue, jaundice |
| 68 | <i>Oroxylum indicum</i> Vent. (DD068) | Saunapatha | Bignoniaceae | [T] | [Br] | [D] | [O] | Amoebic dysentery, jaundice, and antibacterial |
| 69 | <i>Physalis minima</i> L. (DD069) | Chirpoti | Solanaceae | [H] | [RT], [Lf], [Fr] | [D] | [O] | Hypertension, diabetes, and malaria |
| 70 | <i>Pongamia pinnata</i> (Linn.) Pierre. (DD070)* | Karanj | Fabaceae | [T] | [SD] | [Pw], [RW] | [O] | Herpes, antibacterial, antimicrobial, antifungal, and antiviral, liver disorders extensively; it is laxative |
| 71 | <i>Pterocarpus marsupium</i> Roxb. (DD071)** | Bijayasar | Fabaceae | [T] | [HtW] | [D] | [O] | Jaundice, elephantiasis, leucoderma, diarrhoea, dysentery, rectalgia, cough, and greyness of hair |
| 72 | <i>Punica granatum</i> Linn. (DD072)* | Anar | Punicaceae | [Sh] | [Fr] | [D], [RW] | [O] | Jaundice and vomiting |
| 73 | <i>Raphanus sativum</i> Linn. (DD073) | Muli | Brassicaceae | [H] | [RT] | [D] | [O] | Jaundice, intestinal disorders |
| 74 | <i>Ricinus communis</i> Linn. (DD074) | Rendi | Euphorbiaceae | [H] | [SD], [Rt] | [D] | [O] | Jaundice, viral hepatitis |
| 75 | <i>Rosa centifolia</i> Linn. (DD075) | Gulab | Rosaceae | [Sh] | Buds | [D] | [O] | Antitoxic, liver disorder, hyperacidity, laxative, tonic, antitoxic, correcting the digestive system |
| 76 | <i>Saccharum spontaneum</i> Linn. (DD076)* | Kasha | Poaceae | [Gr] | [RT] | [D] | [O] | Diuretic, bleeding disorders |
| 77 | <i>Sida acuta</i> Burm. f. (DD077) | Bariara | Malvaceae | [H] | [WP] | [D] | [O] | Diuretic, jaundice, and tonic |
| 78 | <i>Sida cordifolia</i> Linn. (DD078) | Bala | Malvaceae | [H] | [WP] | [D] | [O] | Diuretic, jaundice, and tonic |
| 79 | <i>Sida rhombifolia</i> Linn. (DD079) | Mahabala | Malvaceae | [H] | [WP] | [D] | [O] | Diuretic, jaundice, and tonic |
| 80 | <i>Solanum nigrum</i> Linn. (DD080) | Makoi | Solanaceae | [H] | [WP] | [D] | [O] | Used in liver disorders and hydrophobia |
| 81 | <i>Solanum surattense</i> Burm. f. (DD081) | Choti Bhatkattaiya | Solanaceae | [H] | [WP] | [D] | [O] | Diuretic, febrifuge, anti-inflammatory |

TABLE 2: Continued.

| Serial number | Plant name | Local name | Family | Habit | Part used | Preparation | Route of administration | Ailments /uses |
|---------------|--|--------------------|-----------------|-------|------------|-------------|-------------------------|---|
| 82 | <i>Solanum torvum</i> Sw. (DD082) | Choti Bhatkattaiya | Solanaceae | [H] | [WP], [RT] | [D] | [O] | Diuretic, digestive liver, and spleen enlargement |
| 83 | <i>Sphaeranthus indicus</i> Linn. (DD083)* | Gorakhmundi | Asteraceae | [H] | [WP] | [D] | [O] | Laxative, diuretic |
| 84 | <i>Tamarindus indica</i> Linn. (DD084) | Email | Caesalpiniaceae | [T] | [Lf] | [D], [J] | [O] | Jaundice, anti-inflammatory |
| 85 | <i>Tephrosia purpurea</i> (Linn.) Pers. (DD085) | Sharpunkha | Fabaceae | [H] | [WP] | [D] | [O] | Viral hepatitis |
| 86 | <i>Terminalia arjuna</i> (Roxb.) W. and A. (DD086) | Arjuna | Combretaceae | [T] | [Fr], [Br] | [D], [RW] | [O] | Diuretic, jaundice |
| 87 | <i>Terminalia bellirica</i> Roxb. (DD087) | Baheda | Combretaceae | [T] | [Fr] | [D], [Pw] | [O] | Hepatitis |
| 88 | <i>Terminalia chebula</i> Retz. (DD088) | Harre | Combretaceae | [T] | [Fr] | [D], [Pw] | [O] | Hepatitis |
| 89 | <i>Tinospora cordifolia</i> (Willd.) Miers ex Hook.f. and Thoms. (DD089) | Giloy | Menispermaceae | [Cl] | [St] | [D] | [O] | Hepatitis, anticancerous |
| 90 | <i>Tribulus terrestris</i> Linn. (DD090) | Gokhru | Zygophyllaceae | [H] | [RT] | [D] | [O] | Diuretic and anti-inflammatory |
| 91 | <i>Trichosanthes anguina</i> Linn. (DD091) | Purwul | Cucurbitaceae | [Cl] | [RT] | [D] | [O] | Hepatitis |
| 92 | <i>Trichosanthes cordata</i> Roxb. (DD092) | Ilaru | Cucurbitaceae | [Cl] | [RT] | [D] | [O] | Hepatitis and abdominal disorders |
| 93 | <i>Trichosanthes cucumerina</i> L. (DD093) | Jangali Parvala | Cucurbitaceae | [Cl] | [RT] | [D] | [O] | Antiviral, alopecia, antipyretic, and liver tonic |
| 94 | <i>Uraria picta</i> Desv. (DD094)* | Shankaraja | Fabaceae | [H] | [RT] | [D] | [O] | Enhances healing, cough, cold, fevers, laxative, and diuretic |
| 95 | <i>Vetiveria zizanioides</i> (Linn.) Nash. (DD095) | Khus Khus | Poaceae | [Gr] | [Lf] | Oil | [O] | Perfumery, anthelmintic agent, and analgesic |
| 96 | <i>Vitis quadrangularis</i> (DD096) | Hathjod | Vitaceae | [Cl] | [WP] | [J] | [O] | Wound healing |
| 97 | <i>Woodfordia fruticosa</i> Kurz. (DD097)* | Dhataki | Lythraceae | [Sh] | [Fl], [Br] | [D] | [O] | Antitoxic |
| 98 | <i>Ziziphus nummularia</i> (Burm. f.) W. and A. (DD098) | Jharber | Rhamnaceae | [T] | [Fr] | [RW] | [O] | Laxative and skin disorders |
| 99 | <i>Ziziphus sativa</i> (DD099) | Beri | Rhamnaceae | [T] | [Fr] | [RW] | [O] | Laxative and antipyretic |
| 100 | <i>Zizyphus jujuba</i> Lamk. (DD100) | Beri | Rhamnaceae | [T] | [Fr] | [RW] | [O] | Diarrhea, fever, and blood purifier |

[Cl]: climber; [Gr]: grass; [H]: herb; [Sh]: shrub; [T]: tree; [Br]: bark; [Fl]: flower; [Fr]: fruit; [Lf]: leaf; [Rh]: rhizome; [RT]: root; [SD]: seed; [WP]: whole plant; [Lt]: latex; [FrP]: fruit Pulp; [Rt Br]: root bark; [HtW]: heart wood; [D]: decoction; [RW]: raw; [J]: juice; [Pt]: paste; [Pw]: powder; [LA]: local application; [O]: oral route. (The images of important plants were provided as Supplementary Material available online at <http://dx.doi.org/10.1155/2015/394307>.)

*Least concern plant.

**Vulnerable plant.

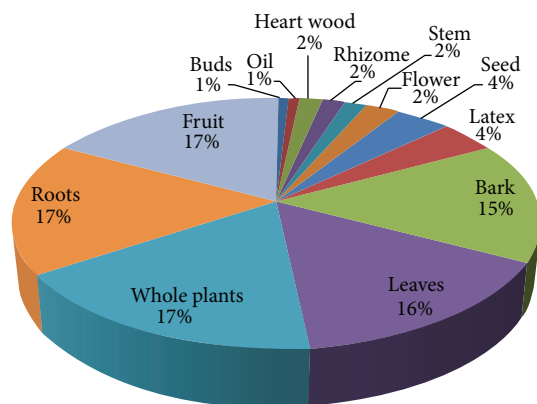


FIGURE 4: Distribution of part used.

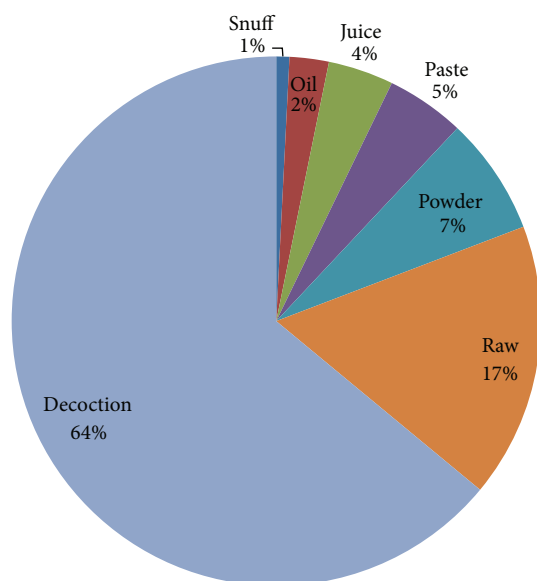


FIGURE 5: Distribution of mode of preparation.

of informants, so as per their request this information is not included in the present paper.

The majority of informant reported that decoction (64%) is the first choice for administration as it can be given with sugar. Another common method of preparation was raw (17%) followed by powder (7%), paste (5%), juice (4%), and oil (1%) (Figure 5). The decoction was obtained by boiling the plant material with water and reduced to one-fourth amount. Most of the drugs are given by oral route (91%). Direct application of paste (with oil) or medicated oil (7%) (Figure 6) is generally done for skin diseases and wounds. Most of the medicines were taken orally which is in conformity with some other studies conducted somewhere else [1, 6, 39].

There are about 13 species which were found to be under red list but out of thirteen only one plant is under vulnerable category and the rest are of the least concern [40].

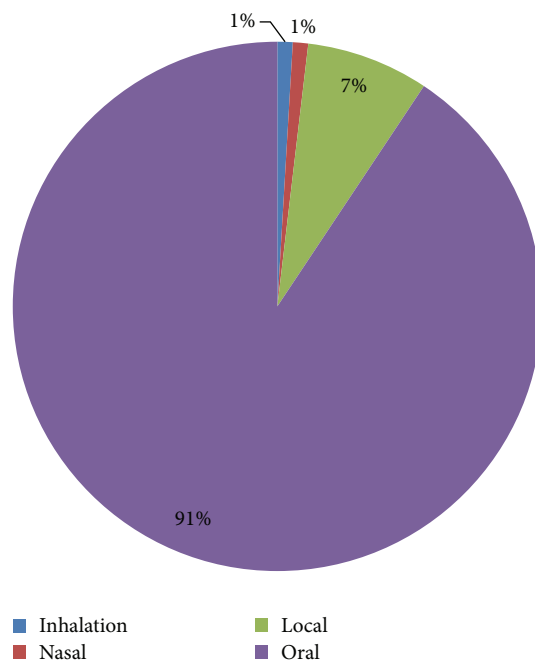


FIGURE 6: Distribution of route of administration.

7. Conclusion

Herbs are always considered as a very important source of medicine especially for the population of the rural areas and tribes because of the high cost and difficult accessibility to modern medicine. This study was conducted in Chandra Prabha Wildlife Sanctuary of Chandauli district, in the south eastern division of Uttar Pradesh, where inadequate ethnobotanical surveys on medicinal plants were conducted. Our findings demonstrated that the area is rich in biodiversity and ethnobotanical tradition. About 100 plants belonging to 43 families are used by the local communities including the tribal and local healers. The plant species with the highest fidelity level (F1) were *Holarrhena antidysenterica*, *Lawsonia inermis*, *Gymnema sylvestre*, *Dalbergia sissoo*, *Cassia fistula* Linn., *Butea monosperma* (Lam.) Kuntze., *Boerhaavia diffusa* Linn., *Albizia lebbbeck* Benth., *Aegle marmelos* Correa., *Sphaeranthus indicus* Linn., and *Solanum surattense* Burm. f. The most frequent ailments reported were hepatitis, jaundice, constipation, and skin and urinary problems. The parts of the plants most frequently used were fruit, roots, and whole plants (17%) followed by leaves (16%) and bark (15%).

Traditional knowledge of the area is greatly affected due to modernization and other factors and there is an urgent need to protect the cultural heritage and traditional knowledge of the natives by justifying the therapeutic potential and biological activities of the plants with reported scientific methods. Also there is a need for special attention to the potential plants of the area which are on the verge of extinction by excessive deforestation and development.

Conflict of Interests

The authors have no conflict of interests to declare.

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