MEDICINAL PLANTS OF PILIBHIT TIGER RESERVE (PTR) INDIA

Gopal Dixit

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ISBN (Online): 978-981-5313-95-6

ISBN (Print): 978-981-5313-96-3

ISBN (Paperback): 978-981-5313-97-0

First published in 2025.

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PREFACE

The present manuscript in the form of a book is based on exhaustive field studies, surveys, questionnaires, and face-to-face interviews with certain ethical, rural people and herbal medical practitioners. These studies were carried out between 2015 to 2019 and covered the study area of the Indo-Nepal sub-Himalayan Terai International border region of Pilibhit Tiger Reserve (PTR), in Uttar Pradesh, India. In the present book, it has been discussed that 117 plants belonging to 44 families having medicinal value, are extensively used to treat more than 100 human and veterinary ailments . Few of these therapeutic practices are very new to the modern world, and most of these plants cure certain diseases in their daily life as these remedies are based on their generation's long traditional practices and passed on from one generation to another. Most of the therapeutic uses were successfully established after repeated trial and error methods by their ancestors.

In this way, the present book is a documentation and compilation of the literature based on their traditional knowledge about the therapeutic practices in their day-to-day life. The main motto of preparing this book is to enlighten the generations with old traditional knowledge about wild plants and their every possible use in treating most diseases. It has been kept in mind while proceeding with the studies on medicinal plants that the administration of many wild plants must have a positive impact on human beings and a negative correlation with most common ailments to draw an exact inference about certain useful plants and their products for their possible commercialization. Several wild and some cultivated plants were collected and thoroughly studied with the help of available literature. In most studies, repeated and replicated questioning methods have been taken to draw a conclusion about claims related to them.

Completion of this book would not have been possible without the unconditional and continuous blessings of **"THE ALMIGHTY"** and my parents. We are also thankful to forest officials of Pilibhit Tiger Reserve of district Pilibhit, UP, India for their cooperation with prior permission during the field visits. The help rendered by tribal heads, herbalists, traditional medical practitioners, and other rural and ethnic people in searching for wild plants and their possible usage as medicines has also been thankfully acknowledged.

The approach of experienced tribal and rural persons living around PTR was very positive toward scientific exploration and documentation of the natural plant products used to treat most of their daily ailments. The help of young tribal people was praiseworthy in collecting wild plants from natural sources in the vicinity of dense forests. Collected plants were identified with the help of available literature and under the guidelines set by our teacher and renowned Taxonomist, late Professor (Dr.) S.C. Sharma.

Last but not least, error finding in the spellings of the content of this book done by our sons Master Astitva and Tishye Dixit is of great importance in the completion of this task in time.

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DEDICATION

This publication is

Dedicated to my beloved wife Late

Dr. Shilpa Vakshasya

St. Alloysius College , PILIBHIT, India

CHAPTER 1

Prologue

Abstract: The persistent and intricate symbiotic relationship between plants and human beings surpasses temporal and cultural borders, profoundly influencing the fundamental nature of human existence. Plants are crucial in providing nourishment, clothing, shelter, and therapeutic resources, making them essential components of everyday existence. The varied nature of this job transcends temporal and geographical boundaries, exhibiting relevance in various communities and historical epochs. The significant role of plants in preserving health and promoting health resonates with the principles of classical wisdom and traditional folk knowledge systems. As society progresses into the future, it is crucial to recognize and safeguard the invaluable knowledge of plants for the collective progress of humanity. The enduring significance of preserving our natural environment and the inherent wisdom it contains is demonstrated by the indisputable interconnectedness between plants and the existence of human beings. In a period characterized by significant technological advancements and profound societal changes, acknowledging and preserving our botanical history is crucial in promoting sustainable development. This chapter emphasizes the inherent connection between the Earth's ecological state and its population's welfare, emphasizing the imperative to save and diligently transmit this floral heritage to succeeding cohorts. The preservation of the deep interrelation between plants and human existence is evidence of the lasting wisdom inherent in the natural world, directing humans toward a future characterized by harmony and sustainability.

Keywords: Botanical wisdom, Interdependence, Symbiotic relationship, Sustainable progress.

INTRODUCTION

The relation between plants and human beings is as old as human civilization on the earth. Plants offer all three basic human needs: food, clothes, and shelter. Most of the things we use daily are gradual conversions of plant products. All herbivores' food comes from plants such as vegetables, fruits, cereals, pulses, *etc.* Even the large animal population depends on the producers, *i.e.*, green plants. In this way, we can say, “all flesh is grass”.

The various sources of food, fibers, wood, drugs, beverages, oils, fats, waxes, *etc.*, are of plant origin. However, plants, in other ways, are responsible, indispensable, and unforgettable for the overall development of life on this earth.

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Fibers also come from plants and are commonly used in weaving clothes, fabrics, ropes, threads, bags, and nets. Papers, cellulose, rayon, cellophane, and other critical industrial articles are made of fibers. Cotton, flax, jute, hemp, ramie, *etc.*, constitute important commercial fibers.

There exist several thousand medicinal plants all over the world. Most plants are known and utilized by herbal doctors and Ayurvedic *Vaidyas*. Many medicinal plants are found growing wild in various parts of the world. Only a few drug plants are cultivated. These plants are collected and prepared in crude in the indigenous way. The medicinal value of the plants producing drugs is due to some chemical substances present in the plant tissues, which can stimulate a definite physiological action in the human body. The most important chemical substances are alkaloids, carbon compounds, hydrogen, oxygen, nitrogen, glucosides, essential oils, fatty oils, resins, mucilage's, tannins, gums, *etc.* Some of these substances are also poisons and proteinaceous in nature.

Ethnic medicine is the best way to understand various aspects of Indian traditional knowledge systems. The most remarkable characteristic of the Indian medical tradition is that it prevails at two levels: the classical and folk systems. We refer to these systems as Ayurvedic, Siddha, and Unani under the classical system. They are characterized by institutionally trained practitioners, a body of text originating since ancient times, and highly developed theories to support the practices. These traditional medicinal systems encompass knowledge of life, health, and diseases of all living forms, including humans, animals, and plants. The branch dealing with traditional animal medicines is known as *Mrigayurveda* [1].

A rich textual base supports both Ayurveda and Unani systems of medical tradition. It is estimated that there are 10-30 million manuscripts in Sanskrit alone, many of them relating to medicine. Parallel to these systems, folk traditions exist, which has been transmitted orally in thousands of our villages throughout the ages. These folk traditions are rich and diverse, including specialized practitioners and home remedies for common ailments. These traditions include knowledge and beliefs regarding the relationship between food and health, yoga, and other preventive physical practices. Specialists work with specific diseases like fractured bone setting, snake-scorpion poisoning treatment, and birth attendance. A conservative estimate stipulates that around 70,000 traditional bone setters throughout the country attend to cover two-thirds of the fractures, as modern orthopedic facilities are few and mainly concentrated in cities and urban areas. Some 600,000 traditional birth attendants (dayees) perform home deliveries.

In India, using plants in medicine is as old as ancient Indian civilization. In Vedas and various other religious scriptures, their uses are frequently mentioned.

Ethnomedicinal knowledge about the uses of plants in different ailments and their cure among various ethnic groups in the Terai region of upper Gangetic plains are vast. This critical source of ethnomedicinal information is still unnoticed.

The ethnobotanical exploration of the remote forest areas of district Pilibhit has revealed that the locals use numerous plant species to treat various ailments. The tribal people have an immense knowledge about the medicinal use of plants. They can identify the plants as per their local names and their uses for treating different human and veterinary diseases.

Plants as Providers of Sustenance

Plants have always played an indisputable role in human history as the silent protectors of our food and survival. Forests are not merely the verdant backdrop of our surroundings but the essential source of our survival. This investigation delves into the deep importance of "Plants as Providers of Sustenance" as we explore how plants nourish and support us, encompassing nutritionally, culturally, and economically. Plants are the major source of essential nutrients our bodies need to grow and remain healthy. The nutritional benefits they provide are truly extraordinary. Fruits, vegetables, grains, legumes, and nuts are the fundamental components of a well-balanced diet. These natural resources are abundant in vital vitamins, minerals, and dietary fiber crucial for our health and overall health. Consider the diverse assortment of fruits, such as oranges, which are rich in vitamin C and enhance our immune system while revitalizing our skin. Spinach and kale, both leafy greens, offer a wide range of essential vitamins, such as A and K, which play crucial roles in maintaining good vision and promoting proper blood coagulation. Plant-based meals are rich in dietary fiber, which supports digestive health and aids in maintaining normal cholesterol levels. In addition to these vital nutrients, plants include a wealth of phytochemicals and antioxidants, which provide anti-inflammatory and anti-cancer benefits. The Mediterranean diet is well-known for its emphasis on plant-based foods such as olive oil, whole grains, and various fruits and vegetables. It is highly regarded for its ability to lower the risk of heart disease and other long-term illnesses.

The emergence of plant-based diets signifies a notable shift in human food consumption patterns. Plant-based diets have gained significance as individuals increasingly prioritize healthier and more sustainable nutritional choices. These diets prioritize the intake of plant nutrients while minimizing or excluding animal-based items. The reasons for this change are complex and include considerations of individual health, animal rights, and environmental impact. Plant-based diets encompass a range of dietary choices, from lacto-vegetarianism, which involves consuming dairy but abstaining from meat, to veganism, which

CHAPTER 2

Study Area Details

Abstract: District Pilibhit, situated in the foothill region of the Indo-Nepal Terai, is recognized as the most affluent biodiversity hotspot within the state of Uttar Pradesh. The municipality, despite its recent establishment, encompasses a historic settlement known as 'Old Pilibhit' situated alongside the Khakra River, which holds significant cultural and historical value due to its association with the Banjaras of the Periya clan. The etymology of the term 'Pilibhit' implies a potential association with 'PeriyaBhit,' which denotes the village mound of the Periyas. Alternatively, it could be derived from a historical reference to a yellow mud wall that used to encompass the district. Pilibhit is geographically located in the Shivalik foothills of the Himalayas and benefits from its accessibility *via* road networks and a meter-gauge railway line, facilitating connections with adjacent districts in the states of Uttar Pradesh and Uttarakhand. The district's importance is further elevated by a multitude of tourism and historical attractions. The Pilibhit Tiger Reserve (PTR) is worthy of attention since it was officially designated by the Central government in 2014. It encompasses an area of 730.24 square kilometers located within the densely forested region of Pilibhit. The study examines the geographic location, topographic features, climatic patterns, and vegetation composition of the region. The primary objective of this extensive investigation is to reveal the complex fabric of Pilibhit, highlighting its ecological abundance, historical origins, and its significant function as a wildlife sanctuary, particularly as the third tiger reserve in the state of Uttar Pradesh.

Keywords: Biodiversity hotspot, Historical significance, Pilibhit tiger reserve, Shivalik foothills, Terai region.

WORKSPACE

District Pilibhit, situated in the foothill area of the Indo Nepal Terai international border region and the richest hotspot of biodiversity in UP State, has been selected for the present study.

The present town is of comparatively recent origin, but there is still a village known as 'Old Pilibhit' standing on the left bank of the Khakra river about 5 Km. to the north-east near the road to Neoria. The Banjaras of the Periya clan had always occupied this village. It is supposed that Pilibhit is the corruption of Periya

Bhit or the village mound of the Periyas, and also that the name Pilibhit has been derived from a yellow mud wall that once surrounded the district.

Pilibhit is situated in the Shivalik foothills of the Himalayas, well connected by road and broad gauge railway line of the North Eastern Railways to its adjoining Districts, *viz.*, Bareilly, Shahjahanpur and Lakhimpur Khiri of Uttar Pradesh and Udham Singh Nagar of Uttarakhand. Many tourist and Historical places increase the overall importance of the district.

Pilibhit Tiger Reserve (PTR) was declared by the central government in 2014, and is the third tiger reserve in the state of Uttar Pradesh, sharing open international boundary with neighboring country Nepal.

From the study point of view, the Study Area has been described under the following subheads:

- Geographical Situation
- Topography
- Climatic Conditions
- Vegetation

GEOGRAPHICAL SITUATION

The district of Pilibhit is the north-eastern most district of Rohilkhand division. It is situated in the foothill region of the terai of upper Gangetic plains, lying between the parallels 28^0 54' - 28^0 60' N latitude and 79^0 37'-88^0 27' E longitude at an elevation of 183.870 m above MSL (Fig. **1**). It is situated in the foothills of Shivaliks of the Himalayas and consists of various mountain ranges. On the north is the district Udham Singh Nagar and the territory of Nepal; on the south lies the Shahjahanpur district; on the east, the district is flanked for a short distance by district Kheri and the remaining distance by the Shahjahanpur district and on the west the district of Bareilly.

The north eastern part of Pilibhit is mostly constituted by the Terai area enriched with several rivers and lakes.

RIVERS & WATER SOURCES

- Sharda
- Chauka or Chuka
- Gomti
- Khannaut
- Mala
- Deoha

- Lohia
- Khakra
- Rapatua
- Sundaria & Kailas
- Apsara
- Pangaili
- Fulhar Lake (Madhotanda)
- Mahadev lake (Jamunia)
- Bari lake (Bithora Kalan)
- Anwar ganj lake (Anwarganj)
- Balpur lake (Balpurmandalia)

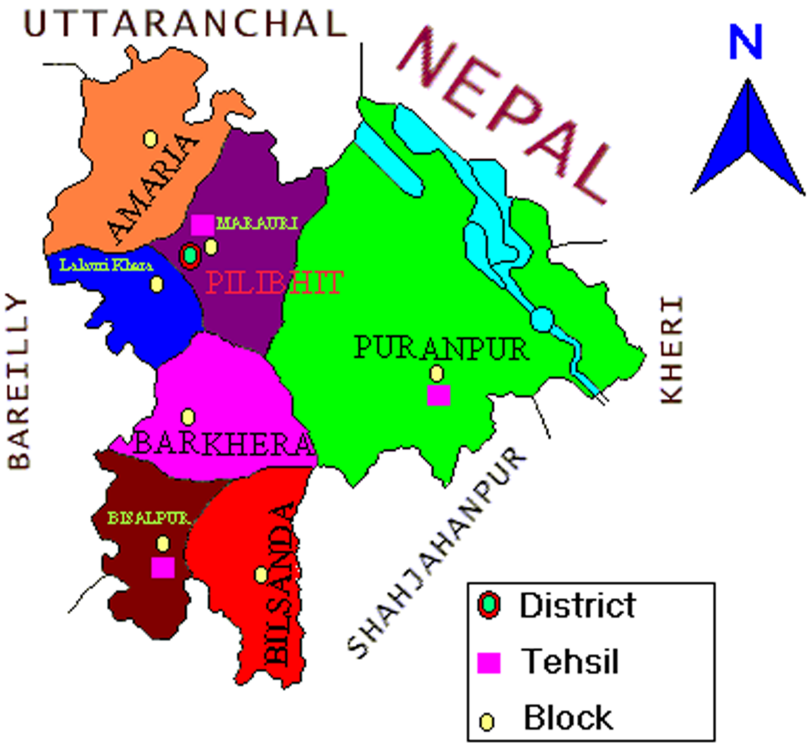

Fig. (1). The geographical area of Pilibhit is 3765.7 sq. Km which is 1.3% of the total geographical area of Uttar Pradesh. Of the district's total area, 99.1% is rural, and 0.9% is urban. In terms of the area, it is the smallest compared to other districts of Bareilly Block.

River Gomti originates from Fulhar lake of Madhotanda; River Khannaut from Madhav lake; River Khera from Anwarganj Lake, Apsara from Badhpur Lake. Besides these, River Mala, Deoha, Katna, Khakra, Kailash, Pangahli originate

CHAPTER 3

Enumeration of Families of Medicinal Plants

Abstract: This study investigates and enlists several plant families in Pilibhit, a foothill district of the Indo-Nepal sub-Himalayan International border region of Terai and one of Uttar Pradesh's richest biodiversity hotspots is here. The study will cover these plant groups' botanical traits, historical usage, and ecological importance. Pilibhit district's unique location and different ecosystems make it excellent for plant biodiversity research. It has been investigated that many plant families, including therapeutic herbs and economically important species. This study details the distribution of several regional plant groups, their ecological roles, and their cultural significance. The research examines medicinal, ethnobotanical, and ethnoveterinary uses of these plant families and their effects on local, healthcare, and traditional practices. It also examines their ecological services, including habitat, food, and soil stabilization, and how they support local biodiversity and ecosystem functioning. This study highlights the Pilibhit district's botanical diversity and the importance of these plant families for conservation, sustainable resource management, and traditional knowledge preservation. Understanding the complex relationships between humans and plants in this biodiversity hotspot is essential for biodiversity conservation and community health.

Keywords: Biodiversity, Healthcare, Medicinal plants, Plant families, Traditional knowledge.

FAMILY ACANTHACEAE

Introduction

The Acanthaceae, or Acanthus, family of flowering plants is incredibly varied and essential in horticulture and traditional medicine [19]. Approximately 250 genera and nearly 2,500 species give this plant family its reputation for diversity [20]. Plants in the family Acanthaceae are most common in the tropics and subtropics, and they thrive well in a broad variety of environments. One of the most defining characteristics of Acanthaceae plants is their bi-labiate blooms, which have two lips that vary in shape and color [21]. The allure of their flowers has made some members of the Acanthaceae family standard fixtures in landscaped decorative areas. Not only are many members of the Acanthaceae family beautiful to look at, but they have also been used for centuries in the traditional medicine systems of many different cultures, including those of Asia, Africa, and the Americas [22].

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The healing powers of these plants have been used to cure a wide variety of illnesses, from fevers to gastrointestinal issues to skin problems. Notable examples are the Ayurvedic herb *Andrographis paniculata* and the traditional Chinese medicine staple *Justicia adhatoda*. Some members of the Acanthaceae family have also attracted the interest of scientists due to the possible medicinal chemicals they contain [23]. Their secondary metabolites, including alkaloids and flavonoids, are still being researched for their potential therapeutic uses. In conclusion, the Acanthaceae family is an exciting collection of plants because of their beauty and medical value. Their ecological and pharmacological potential is underappreciated, but their historical significance in traditional medicine systems makes them a crucial subject of study and conservation efforts.

The plants belonging to the Acanthaceae family have been acknowledged for their possible therapeutic advantages in several traditional medicinal practices. Although they are significant in traditional medicines, seeking advice from healthcare professionals or traditional healers knowledgeable about their usage is recommended to guarantee a secure and efficient treatment. They continue scientific research endeavors to authenticate and enhance comprehension of the precise chemicals accountable for their therapeutic impacts.

• ***Justicia gendarussa*** **Burm. f.**

Local Name: Adusa

Botanical Characteristics: Shrubs of 1-2.5 m height with opposite ascending branches and 10-20 lance-shaped leaves that are simple, opposite7-19 cm long and 4-7 cm wide.

Distribution: Wild

Therapeutic Usage:

Ethnopharmacology:

- Traditionally, it treats many health ailments such as respiratory conditions, fever, and digestive disorders. The leaves of Malabar Nut are reputed to possess antibacterial and anti-inflammatory attributes, making them valuable in treating respiratory infections and gastrointestinal ailments.
- The plant's extracts are integrated into herbal compositions in certain traditional medical treatments.

• ***Ruellia tuberosa*** **L.**

Local Name: Bhukanda

Botanical Characteristics: A perennial herb of 45cm tall, the stem is erect leaves are oblong, and hairy, flowers are pale blue, fruits are dry capsules, and roots are thick, cylindrical, and finger-like.

Distribution: Wild

Therapeutic Usage:

Ethnopharmacology:

- The plant has been traditionally used for medicinal purposes. The tubers of this plant are utilized in traditional medicine in certain cultures due to their probable diuretic qualities.
- Its root is believed to enhance the process of diuresis and can be employed to relieve problems associated with edema.

• ***Barleria prionitis*** **L.**

Local Name: Vajradanti

Botanical Characteristics: Shrub, leaves are elliptical, 5-20 mm long, with spines at the axis, flowers are yellow, sessile, capsule is two-celled, ovate-lanceolate, and 10-20 cm long with a sharp pointed beak about 6 mm long.

Distribution: Wild

Therapeutic Usage:

Ethnopharmacology:

- It is utilized in traditional medicinal practices in certain areas. The plant has historically been used externally on wounds and skin disorders due to its potential as an antibacterial and anti-inflammatory agent.

• ***Adhatoda zeylanica*** Medic. Syn. ***Adhatoda vasica*** Nees in Wall

Local Name: Vasaka

Botanical Characteristics: Shrubs, leaves opposite, simple, elliptic, lanceolate; flowers in thyristor spike, white, bilobed; fruits capsules; seeds tubercular varicose.

Distribution: Commonly grown as a hedge plant.

CHAPTER 4

Review of Results

Abstract: This chapter presents findings from a survey focused on the medicinal utilization of 117 plant species spanning 44 families in the Pilibhit Tiger Reserve (PTR) region. Rather than providing concrete results, the information gathered underscores the importance of further research and clinical trials before the application of these plants for medicinal purposes. Caution is advised, and consultation with modern healthcare professionals is recommended to mitigate potential risks. The primary aim of this chapter is to systematically compile diverse survey results, obtained through questionnaires, creating a valuable resource for researchers and herbalists engaged in future investigations, research and development initiatives, and related studies. Within the PTR region, tribal and rural populations employed these plant species for medicinal purposes, distributed across various environments. The breakdown reveals a prevalence of medicinal plants among Herbs [52], Trees [27] species, followed by Shrubs [19] (Table **1**). Families like Apocynaceae, Liliaceae, Asteraceae, Apiaceae, Leeaceae, Acanthaceae, Asclepiadaceae, Amaranthaceae, Euphorbiaceae, are prominently represented with 54 species belonging to these families (Table **2**). The study identifies genera such as Achyranthes, Cassia, Terminalia, Leea, Allium, and Solanum, with some having multiple species within the study area. This chapter serves as a foundational resource for future investigations, emphasizing the importance of rigorous research and clinical validation before the application of these plants for medicinal purposes. It stands as a valuable reference for researchers and herbalists, contributing to the collective knowledge base and guiding future endeavors in the realms of traditional medicine and biodiversity conservation within the PTR region.

Keywords: Biodiversity, Ethnobotanical knowledge, Healing practices, Medicinal plants.

DISCUSSION

The findings of this survey study are more in the form of information rather than as concrete results. They apply these enumerated plants as medicine, which requires clinical trials and further research. Hence, it is always advisable for anyone to consult their doctors for the avoidance of any loss due to the application of these medicinal plants. The chief motive of writing this manuscript is to compile different results based on several questionnaires in a systematic docu-

ment beneficial for different researchers and herbalists for the future investigations, research and development.

Table 1. The dominant families of medicinal plant in the study region are:

Apocynaceae	09
Liliaceae	07
Asteraceae	06
Apiaceae	06
Leeaceae	06
Acanthaceae	05
Amaranthaceae	05
Euphorbiaceae	05

The study reveals that out of these enumerated herbal plants, 80 were of Ethnopharmacological uses; 13 plants were used in Ethnopharmacology and Ethno-veterinary and 17 in Ethnogynaecology and Ethnopharmacology. At least 7 plants were used in all three: Ethnogynaecology, Ethnopharmacology and Ethnoveterinary (Fig. **1**).

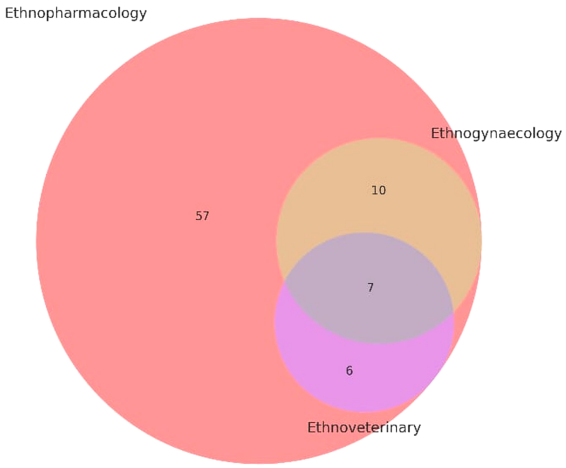

Fig. (1). Diagram of different uses of medicinal plants of the study region.

Ethnic people employed entire plants or suitable plant parts such as root, bulb, tuber, rhizome, stem/wood, leaves (young or adult), stem or root bark, fruits and seeds, or simply seeds only fruit rind, and even flowers. They used varied plant parts as raw crude herbal drug. At the same time, some were prepared to medicine and administered as decoction, infusion, oil, juice, extract, latex, gum, ash,

powder, paste, fumes, syrup, *etc* as per the ailment or disease. This may be applied externally, inhaled or consumed orally as per the prescription. In some instances, contact therapy is also significant *e.g.* placing a drug around the neck of a person, in hair, around waist or arm, *etc.* The patients were also, in few cases were advised to consume a drug as a vegetable or it constitutes their diet (*e.g. Momordica charantia*). It is also observed that while preparing medicines, they use honey, sugar, milk, salt, other plant juices, *etc.* In a few instances, they mutter hymns (mantras) also.

The results show that not only routine diseases like cold, cough, fever, diarrhea & dysentery, stomach disorders were cured by administering herbal drugs but tribals have cure for certain chronic diseases like leucoderma (*Abrus precatorious* L., *Hemidesmus indicus* (L.) Willd. & *Vernonia anthelmintica* R.Br., *etc*) leprosy (*Centella asiatica* Urban, *Cassia fistula* L., *Terminalia alata* Heyne, *Albizzia lebbeck* Benth., *etc*), skin diseases, boils and blisters (*Achyranthes aspera* Hook., *Asparagus racemosus* Willd., *Azadirachta indica* A. Juss., *Bombax ceiba* L. *Cassia tora* L., *Mallotus phillipensis* Mueller, *Vitex negundo* L., *etc.*) rheumatism and arthritis (*Achyranthes aspera* Hook., *Litsea glutinosa* (Lour.) C. B. Robins, *Sida rhombifolia* L., *Vitex negundo* L., *Allium sativum* L., *Boerhaavia diffusa* L., *Calotropis gigantean* (L), *Cuscuta reflexa* Roxb., *Peristrophe bicalyculata* Nees, *etc*), asthma (*Achyranthes aspera* var. *porphyristachia* Hook., *Cissampelos pareira* L., *Piper longum* L., *Bambusa stricta* Roxb., *etc*) snake and scorpion bites (*Rauvolfia serpentina* (L.) *Peristrophe bicalyculata* Nees, *Cissampelos pareira* L., *Achyranthes aspera* var *aspera* L., *Mirabilis jalapa* L. *etc*), bone fracture (*Oroxylum indicum* Vent., *Cassia tora* L., *Leea macrophylla* Roxb. and *Peristrophe bicalyculataetc*) and many more. Plants like *Achyranthes asperava*. *porphyristachia* Hook, *Cassia tora* L., *Nyctanthes arbor-tristis* L., *etc* were used in malarial fever. In contrast, *Alstonia scholars* R. Br., *Azadirachta indica* A. Juss., *Cissampelos pareira* L., *Rauvolfia serpentina* (L.), *Vitex negundo* L., *etc.* were used as febrifuge. *Boerhaavia diffusa* L., *Calotropis gigantean* (L), *Cassia fistula* L., *Cuscuta reflexa* Roxb. *etc.* was used in Jaundice. *Achyranthes aspera* Hook, *Boerhaavia diffusa* L., *Calotropis gigantea* (L), *Cissampelos pareira* L., *Emblica officinalis* Gaertn., *etc.* were used in various ophthalmic troubles. *Achyranthes aspera* Hook, *Boerhaavia diffusa* L., *Cuscuta reflexa* Roxb., *etc.* were used in various venereal diseases. *Aegle marmelos* Correa, *Azadirachta indica* A. Juss., *Syzigium cuminii* L., *Momordica charantia* L. *etc.*, were used to treat diabetes. *Abrus precatorious* L., *Achyranthes aspera* Hook, and *Urginia indica* Kunth were used as antifertility and aborting agents. Some plants are used only externally such as roots of *Achyranthes aspera* var. *porphyristachia* Hook., when tied to the stomach of pregnant women helps in easy delivery. This shows the potency of plants in human health care.

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Gopal Dixit

Dr. Gopal Dixit is a distinguished Indian botanist, educator, and researcher with over 20 years of experience in Botany, Ethnobotany, and Environmental Sciences. He currently serves as the Head of the Botany Department at Upadhi Post Graduate College, affiliated with MJP Rohilkhand University, Pilibhit, Uttar Pradesh.

Dr. Dixit completed his B.Sc. in Zoology, Botany, and Chemistry in 1992 and earned his M.Sc. in Botany in 1994 from MJP Rohilkhand University. He later pursued an additional M.Sc. in Ecology and Environment from Sikkim Manipal University in 2003 and obtained his Ph.D. in 2004. His doctoral research focused on the effects of fertilizer waste on tomato plants, with significant implications for agricultural productivity and environmental health.

Throughout his career, Dr. Dixit has contributed to academic research, including a UGC-funded project on medicinal plants, where he applied tissue culture techniques for vegetative propagation. His work in ethnobotany has advanced understanding of the medicinal uses of plants in traditional healthcare systems.

Dr. Dixit is also deeply committed to education, mentoring students, guiding research projects, and promoting accessible learning. He runs a YouTube channel, Study with GD Sir, sharing insights on Botany and related subjects.

In 2023, Dr. Dixit began pursuing a Doctor of Science (D.Sc.) in Botany from Manipur International University, reaffirming his dedication to advancing knowledge in the field.

His contributions to plant sciences and conservation, particularly in medicinal plants, have made him a respected figure in academia. As a leader, educator, and researcher, Dr. Dixit continues to inspire students and peers while shaping the future of Botany.