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| 1 Dr. Naveen Sharma –            | 1 Book     |
| 2 Prof. Bhagwati Prasad Sharma – | 9 chapters |
| 3. Dr. Rajesh Kumar -            | 2 Chapters |
| 4. Dr. Sunita Saklani -          | 2 Chapters |

# Constitutional and Administrative Aspects of Himachal Pradesh (Public Administration)

by

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# 7 Cancer Imaging Enhancement through Nanotechnology

Samjeet Singh Thakur and Bhagwati Prashad Sharma

## ABBREVIATIONS

Acronym	Full Form
CT	computed tomography
XCT	X-ray computed tomography
PET	positron emission tomography
SPECT	single-photon emission computed tomography
MRI	magnetic resonance imaging
fMRI	functional magnetic resonance imaging
NMI	nuclear medicine imaging
DWI	diffusion-weighted imaging
SPIOs	superparamagnetic iron oxide nanoparticles
PEG	polyethylene glycol
PLGA	poly(lactic-co-glycolic acid)
PEI	polyethyleneimine
PVA	polyvinyl alcohol
ZnO	zinc oxide
C-Dot	quantum dot
Fe <sub>2</sub> O <sub>3</sub>	hematite
Fe <sub>3</sub> O <sub>4</sub>	magnetite
Au	gold
Bi	bismuth
Co	cobalt
Cu	copper
Fe	iron
Gd	gadolinium
I	iodine
Tc	technetium

## 7.1 INTRODUCTION

*Cancer imaging* (Chapman et al. 2013) refers to the use of various medical imaging techniques to visualize and detect cancer within the human body. The primary goal of cancer imaging is to identify the presence, location, size, and extent of tumors or cancerous lesions. It plays a critical role in cancer diagnosis, staging, treatment planning, and monitoring the response to treatment.

For the past few decades, nanotechnology in cancer treatment has involved the use of tiny particles and devices at the nanoscale to target and treat cancerous cells. These nanoscale tools can enhance the precision and effectiveness of therapies while minimizing damage to healthy tissue. Nanotechnology plays a pivotal role in enhancing cancer imaging by harnessing the unique properties of nanoscale materials (Zhang et al. 2019). By developing nanoscale contrast agents and

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## Chapter 2

### Chemical constituents and TLC profiling of flowers of *Psydrax dicoccos* Gaertn.

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#### ABSTRACT

*Psydrax dicoccos* flowers were subjected to qualitative phytochemical screening and Thin Layer Chromatography (TLC) analysis to identify and characterize their bioactive compounds. Phytochemical screening revealed the presence of tannins, saponins, phenols, reducing sugars, and alkaloids in the ethanol and aqueous extracts. TLC profiling using different mobile phases showed distinct R<sub>f</sub> values for the hydroethanolic and acetone extracts. The study demonstrates the potential of *P. dicoccos* flowers as a source of bioactive compounds with potential therapeutic applications. Further studies are needed to isolate and characterize the specific compounds responsible for the observed phytochemical and TLC profiles.

Keywords: Trees, water indicators, phytochemicals

#### INTRODUCTION

The increasing emergence of antimicrobial resistance has become a pressing global health concern, rendering conventional antibiotics ineffective against various

## Chapter 5

### Evaluation of medicinal values and phytochemical analysis of *Lantana camara* flowers: Identification of bioactive compounds

Bhagwati Prashad Sharma<sup>1</sup>, Abhishek Kumar<sup>2</sup>, Rahul Kumar<sup>3</sup>,  
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#### ABSTRACT

The present study showcases the phytochemical analysis of *Lantana camara* flowers, focusing on the qualitative and quantitative assessment of bioactive compounds. The qualitative analysis revealed the presence of tannins, saponin, terpenoid groups, reducing sugars, and alkaloids in the hydroethanolic extract. Thin-layer chromatography (TLC) analysis using different mobile phases, further confirmed the presence of various bioactive compounds, with distinct R<sub>f</sub> values for the acetone and hydroethanolic extracts. These findings suggest that *Lantana camara* flowers possess potential medicinal properties, warranting further research and exploration of their therapeutic applications.

Keywords: Bioactive compound, flowers, medicinal uses

#### INTRODUCTION

The search for novel bioactive compounds has led researchers to explore various natural sources, including plants (Cragg and Newman, 2013; Nasim *et al.*, 2022). Flowers have been recognized as a rich source of bioactive compounds, with many



## CHAPTER 3

### Investigating the bioactive compounds and the therapeutic potential of *Ficus hispida* L.f.

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**Abstract:** *Ficus hispida*, a species of fig tree group, is widely utilized in traditional medicine for its diverse therapeutic applications. This abstract summarizes investigations into its bioactive compounds and their associated therapeutic potential. Phytochemical analyses revealed that *F. hispida* is rich with diverse secondary metabolites. These compounds collectively contribute to a broad spectrum of pharmacological activities. Literature studies have also reported its significant hepatoprotective, antioxidant, and anti-inflammatory properties, validating its traditional uses for liver ailments and inflammatory conditions. The chapter aims to provide an ethnomedicinal, pharmacological and phytochemical analysis of the bark of *F. hispida*. The wealth of bioactive compounds underscores its considerable therapeutic potential, warranting further research to elucidate specific mechanisms and develop evidence-based phytomedicines.

**Keywords:** Ethnomedicinal, ecological, pharmacological, phytochemical



# Chapter 1

## Indigenous Traditional Knowledge of Meitei Community

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### ABSTRACT

Present study documents the indigenous traditional knowledge of the Meitei community in Manipur, India, focusing on the local plants used for various purposes. A total of 30 plant species, belonging to 25 families, were recorded, with uses ranging from food, medicine, and cultural activities to other purposes. The study highlights the significance of these plants in the daily life of the Meitei people and emphasizes the need for conservation and sustainable use of these plant resources. This documentation also contributes to the preservation of the traditional knowledge of the Meitei community, which is at risk of being lost over time.

**Keywords:** Indigenous; Manipur; Local plants; Traditional

### INTRODUCTION

The Meitei community, indigenous to Manipur, India, has a rich cultural heritage and traditional knowledge system (Loukrakpam *et al.*, 2020; Devi and Kumar, 2021; Mukherjee *et al.*, 2022; Dimri *et al.*, 2024; Sharma *et al.*, 2024; Devi *et al.*, 2024a). For centuries, the Meitei people have relied on local plants for their daily needs, including food, medicine, and spiritual practices (Kumar *et al.*, 2022; Raut *et al.*, 2022; Dagawal *et al.*, 2022; Lyngdoh *et al.*, 2022; Devi *et al.*, 2024b). However, this traditional knowledge is rapidly eroding due to modernization, urbanization, and cultural assimilation (Arjona-Garcia *et al.*, 2021). In recent years, there has been a growing recognition of the importance of documenting and preserving indigenous knowledge system (Negi *et al.*, 2023). Keeping this in view, the present study aims to contribute to this effort by documenting the local plants used by the Meitei community for various purposes. The study focuses on the



## Chapter 6

### Ethnobotanical knowledge of Gujjar tribe of Himachal Pradesh, India

Bhagwati Prashad Sharma<sup>1\*</sup>, Vishal Chaudhary<sup>2</sup>, Parveen Sankhyan<sup>3</sup> and Sanjeet Kumar<sup>4</sup>

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#### ABSTRACT

Present study documented the traditional uses of various plants by the Gujjar tribe of Himachal Pradesh, India, for food and medicine. Field and literature survey was carried out during 2022-2025. Results revealed that the tribe utilizes a diverse range of plants, including fruits, leaves, roots, and seeds, to treat various ailments such as diabetes, asthma, skin infections, and digestive issues. Present study highlights the importance of preserving traditional knowledge of Gujjar tribe and the potential benefits of enumerated plants for human health and nutrition.

**Keywords:** Himachal Pradesh, indigenous knowledge, nutraceuticals, plants

#### INTRODUCTION

For centuries, rural and tribal communities have relied heavily on traditional knowledge of local plants as a fundamental part of their healthcare and food purposes (Jena *et al.*, 2025; Devi *et al.*, 2025a; Sharma *et al.*, 2025). In India, the diverse flora has been utilized by various ethnic groups as food and to treat a range of ailments, from common illnesses to chronic diseases (Devi *et al.*, 2025b; Sahu *et al.*, 2025). The Gujjar tribe, a prominent tribal community in Himachal Pradesh, has a rich tradition of using plants for food and medicine, passed down through generations (Rana *et al.*, 2019). The community reliance on traditional medicine is

## Chapter 8

### Phytochemical analysis of seeds of *Abrus precatorius* L. (Fabaceae)

Anju Kumari Thakur<sup>1</sup>, Jogdand Sandhya Khushalrao<sup>2</sup>, Bhagwati Prashad Sharma<sup>3</sup>, Surender Kumar<sup>4</sup>, Arjun Patra<sup>5</sup>, Subhalakshmi Rout<sup>6\*</sup> and Sanjeet Kumar<sup>6</sup>

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**Abstract:** *Abrus precatorius*, a plant traditionally used in medicine, was analysed for its phytochemical constituents. Seeds of the plant were extracted using n-hexane, ethanol, and aqueous solvents, and the resulting extracts were screened for bioactive compounds. The phytochemical analysis revealed the presence of tannins, saponins, flavonoids, phenolic compounds, reducing sugars, and alkaloids in the seeds. The findings of this study suggest that *A. precatorius* seeds possess a rich phytochemical profile, which may contribute to their traditional medicinal uses and potential pharmacological activities. Further studies are needed to isolate and characterize the specific compounds responsible for the plant's bioactive properties.

**Keywords:** Bioactive compounds, Fabaceae, pharmacology

#### INTRODUCTION

Climbing plants, including vines and lianas, have been a rich source of medicinal agents for centuries (Sethi *et al.*, 2023). These plants have evolved unique adaptations to thrive in a variety of environments, and many have developed bioactive compounds to protect themselves from pathogens, insects, and other predators (Burriss *et al.*, 2018). As a result, climbers have been used as traditional medicinal agents (Khillar *et al.*, 2022; Vijayvargiya and Shrivastava, 2023).

# Chapter 6

## *Pongamia pinnata* (L.) Pierre: versatile tree for sustainability and medicine

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**Abstract:** *Pongamia pinnata*, commonly known as Karanja or Indian beech, is a versatile and multipurpose tree with significant ecological, medicinal, and economic importance. The tree is a remarkable source of biofuel, with its seeds producing non-edible oil rich in polyunsaturated fatty acids, which can be converted to biodiesel. Furthermore, *P. pinnata* has a rich history in traditional medicine, where its various parts are utilized to treat ailments such as skin diseases, rheumatism, ulcers, diabetes, and tumors. The tree exhibits pharmacological properties, including anti-inflammatory, antioxidant, anti-diarrheal, and anti-hyperglycemic effects, attributed to its diverse phytochemical composition. With its potential to address global challenges like climate change, energy security, and sustainable agriculture, *P. pinnata* emerges as a crucial resource for ecological restoration and medicinal innovation.

**Keywords:** Karanja, medicinal plants, traditional medicine, ecological significance

### Introduction

*Pongamia pinnata*, commonly known as Indian-beech, Karanja, or Poonga oil tree, is a medium-sized, perennial tree belonging to the Fabaceae family. It is an important non-edible minor oilseed tree primarily found in semiarid regions

# IONIC LIQUIDS (ILs) IN CHEMISTRY: A TRANSFORMATIVE PARADIGM:

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## INTRODUCTION OF IONIC LIQUIDS (ILs):

Ionic liquids (ILs) are viscous mixtures composed of anions and cations, characterized by low vapor pressure, low melting point, and excellent chemical and thermal stabilities. Ionic liquids have ability to dissolve a variety of substances due to this they hold promise for various applications in organic synthesis and serve as alternatives to traditional organic solvents. While they may not fully follow to the principles of green chemistry, they exhibit certain environmentally friendly aspects. In 1888, Gabriel and Weiner reported the first ionic liquid, ethanolanmonium nitrate (EAN)  $[\text{CH}_3\text{CH}_2\text{NH}_3]^+[\text{NO}_3]^-$  or ethylamine nitrate (Figure 1).

anions and cations, characterized by low vapor pressure

## CHAPTER 10

## Nano-cosmetics and Nano-medicines

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**Abstract:** In today's fast-moving scenario, nanotechnology has already spread its wings to nanocosmetics and nanomedicines due to the wide range of physical and chemical properties associated with nanoparticles. Different types of nanoparticles, like nanoliposomes, fullerenes, solid lipid nanoparticles *etc.*, have made their entrance into the nanocosmetic industry. However, the safety concern of nanoparticles has forced the cosmetic industry to limit their applications. The pharmaceutical industry has explored the benefits of nanotechnology; it has developed dendrimers, micelles, drug conjugates, metallic nanoparticles *etc.* The brief explanation of these nanoparticles provides a salient glimpse of why they are used in nano pharmaceutical and medicinal chemistry.

- Metallic nanoparticles: Used for drug delivery, cancer treatment, and also in biosensors.
- Nano-liposomes: Bio-compatible and possess entrapment efficiency.
- Nano-emulsions: Used for controlled delivery of bioactive materials.

**Keywords:** Fullerenes, Metallic nanoparticles, Nanocosmetics, Nanomedicines, Nanoliposomes, Solid lipid nanoparticles.

## INTRODUCTION: NANO-COSMETICS

## Introduction to Cosmetics

Cosmetics are a class of skincare and personal care products that are used to modify and improve a person's appearance. A large number of cosmetics are available in the market; each is designed for different purposes and possesses di-

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# Importance of Honeybees for Biodiversity Conservation and Food Security

Sunita Saklani

## ABSTRACT

Honeybees being a part of a diverse ecosystem have substantial importance in biodiversity maintenance by providing invaluable services of pollination that lead to productivity enhancement of agricultural, horticultural, and flora of natural habitats. These are essential for fulfilling indispensable human needs like food, and medicine and maintaining a healthy ecosystem for survival. These are contributed stupendously to achieve most of the target under the sustainable development goal by 2030 through their reproduction aid to the plants and other bee products. The bee population is facing the challenge of being endangered due to anthropologically driven factors like habitat destruction, pesticide use, parasitic proliferation, species competitiveness, and climatic and land use changes. Therefore the current review is an attempt to understand the essential role of honeybees played in biodiversity conservation and sustainable development goals, so that bee conservation policies should be formulated and implemented.

**Keywords:** Biodiversity, Ecosystem, Honey Bee, Importance, Pollination, Pesticide.

## INTRODUCTION

Biodiversity is an important aspect of human survival on Earth owing to its invaluable products providing for health and food security and essential for life sustenance. The inhabiting species diversity of the ecosystem safeguards mankind from the emergence and spread of infectious diseases (Bharti, 2020). The

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valuable medicine derived from natural chemicals and antibiotics produced by diverse groups of flora and fauna comprising biodiversity is responsible for increasing life expectancy in developed countries. It is not only humans but also other animals like apes, Orangutans, Chimpanzees, Gorillas, etc. have benefited through self-medicating with valuable plants. Taking account pollination, the majority of the flowering plants (about 90% of species) depend on insect diversity and other animals for