



جامعة الانبار - مركز دراسات الصحراء



العلوم	الكلية
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Medicinal plants biotechnology	المادة باللغة الانجليزية
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Ethnopharmacology and Traditional Knowledge Systems	عنوان المحاضرة باللغة الانجليزية
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MPB-L5	رقم المحاضرة
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محتوى المحاضرة

Introduction

Ethnopharmacology is the interdisciplinary scientific exploration of biologically active substances used traditionally by various ethnic and cultural groups. It integrates pharmacology, botany, anthropology, and ethnobotany to document, analyze, and validate traditional medicinal knowledge.

Traditional knowledge systems (TKS) encompass the holistic understanding of health and healing practices passed down through generations, often orally, within indigenous and local communities. These systems form the foundation for modern drug discovery and sustainable bioprospecting.

5.2 Definition and Scope of Ethnopharmacology

- **Ethnopharmacology** studies the use of medicinal plants, fungi, and animal-derived products in traditional medicine systems.
- It aims to validate traditional remedies and identify novel therapeutic compounds.
- Focus areas include:
 - Herbal remedies
 - Sacred rituals and healing practices
 - Socio-cultural beliefs around health and disease



5.3 Traditional Knowledge Systems (TKS)

5.3.1 Characteristics of TKS

- Community-based
- Empirical and adaptive
- Oral transmission
- Spiritual and ecological integration

5.3.2 Major Traditional Medicine Systems

System	Region	Features
Ayurveda	India	Tridosha theory, use of polyherbal formulations
Traditional Chinese Medicine (TCM)	China	Yin-Yang balance, Qi, acupuncture, and herbs
Unani	Middle East, South Asia	Humoral theory (hot, cold, moist, dry)
Siddha	South India	Emphasis on mineral and herbal remedies
African Traditional Medicine	Africa	Herbalism, divination, ancestral healing
Native American Healing	Americas	Medicinal plants, sweat lodges, ceremonies

5.4 Role of Indigenous Knowledge in Drug Discovery

- Many modern drugs (e.g., aspirin, morphine, artemisinin) originate from ethnobotanical leads.
- Indigenous communities hold extensive knowledge about plant uses, dosage, toxicity, and preparation.
- Ethnopharmacological studies often involve:
 - Field surveys and interviews
 - Collection of plant specimens
 - Preparation of crude extracts
 - Pharmacological screening and validation

5.5 Methodology in Ethnopharmacological Research

5.5.1 Fieldwork and Data Collection

- Ethnobotanical interviews (semi-structured or open-ended)
- Participant observation
- Plant collection and herbarium documentation

5.5.2 Ethical Considerations

- Prior informed consent
- Benefit-sharing and recognition of knowledge holders
- Cultural sensitivity and respect for sacred traditions

5.5.3 Bioassay-Guided Fractionation

- Crude extract tested for biological activity.
- Active fractions isolated and characterized.



- In vitro and in vivo assays used for validation.

5.6 Protection of Traditional Knowledge

5.6.1 Threats to Traditional Knowledge

- Biopiracy
- Loss of biodiversity
- Cultural erosion
- Commercial exploitation without compensation

5.6.2 Legal Frameworks

Agreement	Focus
Convention on Biological Diversity (CBD)	Sovereignty over natural resources, benefit-sharing
Nagoya Protocol (2010)	Access and benefit-sharing mechanisms
TRIPS Agreement (WTO)	Intellectual property rights over plant-based inventions
WIPO Traditional Knowledge Division	Protection of traditional knowledge through legal instruments

5.7 Case Studies in Ethnopharmacology

5.7.1 Artemisinin from *Artemisia annua*

- Derived from traditional Chinese medicine for treating fevers.
- Isolated by Youyou Tu, leading to the development of antimalarial drugs.

5.7.2 Hoodia (*Hoodia gordonii*)

- Used by San people in Southern Africa to suppress hunger.
- Led to commercial development of appetite-suppressing supplements.

5.7.3 Neem (*Azadirachta indica*)

- Widely used in Indian traditional medicine.
- Recognized for its pesticidal, antimicrobial, and anti-inflammatory properties.

5.8 Importance of Ethnopharmacology in Modern Medicine

- Helps identify leads for novel drug discovery.
- Preserves endangered traditional knowledge.
- Promotes sustainable use of medicinal plant resources.
- Encourages community participation in conservation and benefit-sharing.

5.9 Integration of Traditional and Modern Medicine

- WHO encourages integration to improve healthcare access.
- Challenges include:
 - Scientific validation of traditional remedies
 - Regulatory frameworks and quality control
 - Training of healthcare professionals in ethnopharmacology



- Examples of integration:
 - Herbal medicines in primary healthcare in China and India.
 - Development of herbal pharmacopeias.

5.10 Summary

Ethnopharmacology bridges the gap between ancient healing traditions and modern pharmacological science. Traditional knowledge systems have significantly contributed to drug discovery and biodiversity conservation. Respectful, ethical, and scientifically rigorous approaches to studying ethnopharmacology ensure both innovation and cultural preservation.

Key Terms

- **Ethnopharmacology:** Study of traditional medicinal practices and substances.
- **Traditional Knowledge:** Community-based knowledge systems passed down orally.
- **Bioprospecting:** Exploration of natural resources for commercially valuable compounds.
- **Bioassay-Guided Fractionation:** Method of isolating bioactive compounds.
- **Nagoya Protocol:** International agreement on equitable benefit-sharing.

Review Questions

1. Define ethnopharmacology and explain its interdisciplinary nature.
2. What are the key features of traditional knowledge systems?
3. Discuss the role of indigenous knowledge in the discovery of modern drugs.
4. What are the ethical considerations in ethnopharmacological research?
5. How can traditional and modern medicine systems be integrated?

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