



جامعة الانبار - مركز دراسات الصحراء



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Conservation and Sustainable Use of Medicinal Plants	عنوان المحاضرة باللغة الانجليزية
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محتوى المحاضرة

Introduction

Medicinal plants are vital resources for global healthcare, traditional practices, and pharmaceutical industries. However, increasing demand, habitat loss, overharvesting, and climate change threaten their survival. Conservation and sustainable use are essential to ensure the longevity of medicinal plant resources for future generations and continued scientific research.

6.2 Importance of Medicinal Plant Conservation

- **Ecological Value:** Integral components of ecosystems and biodiversity.
- **Cultural Value:** Foundation of traditional medicine systems.
- **Economic Value:** Raw material for pharmaceuticals, cosmetics, nutraceuticals.
- **Scientific Value:** Potential for new drug discovery and development.

6.3 Threats to Medicinal Plant Biodiversity

6.3.1 Overharvesting

- Unsustainable wild collection
- High demand for specific plant parts (e.g., roots, bark, rhizomes)
- Lack of harvesting regulations



6.3.2 Habitat Destruction

- Deforestation, agriculture, urbanization
- Mining and infrastructure development

6.3.3 Invasive Species and Climate Change

- Competition from invasive species
- Changes in precipitation and temperature affecting plant distributions

6.3.4 Loss of Traditional Knowledge

- Erosion of indigenous knowledge systems
- Decreased interest in traditional medicine by younger generations

6.4 Conservation Strategies

6.4.1 In Situ Conservation

- **Definition:** Conservation of species in their natural habitats.
- **Methods:**
 - Establishment of protected areas (e.g., national parks, biosphere reserves)
 - Sacred groves and community forests
 - Wild population monitoring

6.4.2 Ex Situ Conservation

- **Definition:** Conservation of species outside their natural habitats.
- **Methods:**
 - Botanical gardens
 - Seed banks (e.g., Millennium Seed Bank)
 - Field gene banks and tissue culture repositories
 - Cryopreservation of germplasm

6.4.3 On-Farm and Home Garden Conservation

- Cultivation and maintenance by local communities
- Integration into agroforestry systems

6.5 Sustainable Utilization of Medicinal Plants

6.5.1 Good Agricultural and Collection Practices (GACP)

- Guidelines developed by WHO to ensure:
 - Quality, safety, and efficacy of herbal materials
 - Minimization of environmental impact
 - Fair labor and ethical sourcing

6.5.2 Cultivation and Domestication

- Reduces pressure on wild populations
- Allows quality control and standardized supply
- Example crops: *Withania somnifera*, *Aloe vera*, *Artemisia annua*

6.5.3 Community-Based Resource Management

- Involvement of indigenous and local communities
- Capacity-building and knowledge sharing
- Local bylaws and benefit-sharing models



6.6 Legal and Institutional Frameworks

Agreement / Organization	Role
Convention on Biological Diversity (CBD)	Promotes conservation and sustainable use
Nagoya Protocol	Ensures fair and equitable benefit-sharing
CITES	Regulates international trade of endangered species
IUCN Medicinal Plant Specialist Group	Conservation assessments and red listing
WHO Guidelines	Standards for herbal medicine cultivation and trade

6.7 Role of Biotechnology in Conservation

6.7.1 Micropropagation

- Rapid, large-scale multiplication of endangered species
- Example: *Taxus baccata*, *Nothapodytes nimmoniana*

6.7.2 Cryopreservation

- Long-term storage of plant germplasm at ultra-low temperatures

6.7.3 DNA Barcoding and Genomic Tools

- Identification and authentication of medicinal plant species
- Monitoring of genetic diversity

6.7.4 Synthetic Seed Technology

- Encapsulation of somatic embryos or shoot buds for conservation and distribution

6.8 Case Studies in Conservation

6.8.1 Himalayan Medicinal Plants

- Region: India, Nepal, Bhutan
- Species: *Picrorhiza kurroa*, *Nardostachys jatamansi*
- Strategy: Community cultivation, policy support, and training

6.8.2 Traditional Chinese Medicinal Plants

- Species: *Panax ginseng*, *Ephedra sinica*
- Strategy: Domestication, legal regulation, and sustainable harvesting

6.8.3 Africa's Endangered Medicinal Flora

- Species: *Prunus africana* (used for prostate treatment)
- Strategy: Controlled harvesting and agroforestry integration

6.9 Integration of Conservation with Local Livelihoods

- **Eco-enterprises:** Medicinal plant-based products create income and incentivize conservation.
- **Ethnobotanical tourism:** Promotes cultural preservation and conservation awareness.
- **Fair trade and organic certification:** Support sustainable value chains.



6.10 Summary

Conserving medicinal plants is a multidimensional task requiring ecological, social, cultural, and biotechnological strategies. Both in situ and ex situ conservation, guided by ethical and legal frameworks, ensure sustainable use. Biotechnology plays a pivotal role in propagation and preservation, while community participation and benefit-sharing mechanisms strengthen conservation at the grassroots level.

Key Terms

- **In Situ Conservation:** Protection of plant species in their natural ecosystems.
- **Ex Situ Conservation:** Conservation outside natural habitats.
- **Cryopreservation:** Storage of biological material at very low temperatures.
- **GACP:** Good Agricultural and Collection Practices.
- **Nagoya Protocol:** International agreement on access to genetic resources and benefit-sharing.

Review Questions

1. What are the major threats to medicinal plant biodiversity?
2. Differentiate between in situ and ex situ conservation with examples.
3. How can biotechnology aid in medicinal plant conservation?
4. Explain the principles and benefits of GACP.
5. Describe a case study where community-based conservation has been successful.

References

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