

# ***E-CONTENT***

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## **UDAI PRATAP COLLEGE, VARANASI**

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**Programme/Class:** Diploma in Plant Identification, Utilization & Ethnomedicine

**UG, Year: II, Semester: IV, Paper: I, UNIT-V**

**Subject: Botany; Course Code: B040401T;**

**Course Title:** Economic Botany, Ethnomedicine and Phytochemistry

**Topic:** *Plant Conservation & Cultivation*

**Credits: 4, Course compulsory; Max Marks: 25+75**

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## ***PLANT CONSERVATION AND CULTIVATION***

**Conservation is the act of protecting Earth's natural resources for current and future generations.**

Conservation of life on Earth consists of three important aspects:

- i. Biological Diversity;**
- ii. Ecological integrity; and**
- iii. Ecological health.**

Medicinal plants have been used in developing countries for thousand of years. World Health Organization (WHO) estimated that 70-80% of the population living in India, Africa and other developing countries depend on traditional healthcare systems for primary healthcare. Medicinal Plants (MPs) and herbal medicines form an important part of the treatment in the indigenous medicine system such as Ayurveda, Unani Siddha, Traditional Chinese Medicine, Tibetan Medicine, Julu etc.

The ushering in of modern technologies catapulted MPs into patent war zone as highly valuable commodities. Many developed and developing countries are actively engaged in bio-mining MPs for therapeutically precious and biologically active phytochemicals. Many modern drugs for treating constipation to cancer are derived from plants. In 1980, 25% of the prescription drugs dispensed through

community pharmacies in USA had one or more ingredients of plant origin. The value of these drugs was estimated at US\$ 8.1 billion. In 1981, 121 scheduled drugs obtained from 95 plant species were used globally. In 1995 it was presumed that tropical forests carry potential to carry to produce 328 plant drugs worth US\$ 147 billion. Increasing pressure on forest lands due to uncontrolled population growth, changing weather patterns, biodiversity of plants in general and MP species in particular are facing threat of erosion and extinction in their natural habitats. This calls for immediate strategies for conserving MPs through policies that encourage sustainable supplies to meet the growing global demand (8-15% per annum for MP products).

***The global herbal medicine market size was valued at US\$ 151.91 billion in 1921 and the market is projected to grow from US\$ 165.66 billion in 2022 to US\$ 347.50 billion by 2029.***

The use of alternative medicines, such as herbal products, has been increasing over the last decade. Herbal products are gaining popularity among patients as well as healthcare professionals. **According WHO, almost 10-50% of the population in developed countries use herbal products regularly in some form. The major reason for using herbal products is their better immunity than synthetic drugs.** In developing countries, such as China, Japan, India, Vietnam, South Africa, and Bangladesh, herbal medicines are sometimes the only affordable and available treatment option. Consumers mainly opt for these medicines for cough and cold, nervous, gastrointestinal sickness, and painful conditions such as joint pain, rheumatic diseases, and stiffness.

**The global herbal medicine market is forecasted to be worth US\$ 284.75 billion by 2028 from 200.95 billion in 2023.**

## **THE FUTURE OF HIGH-VALUE MEDICINAL & AROMATIC PLANTS**

The importance of medicinal plants and derivatives is growing rapidly with human progress in pharmaceuticals fields. These plants are a potential source of bio-molecules that play a major role in modern medicine in the treatment of diseases like CANCER, DIABETES and HYPERTENSION among others. The demand for medicinal herbs is increasing thanks in part to a reputation for fewer side effects. They are also considered to be cost-effective means of developing new and breakthrough drugs.

India is a treasure trove of medicinal plants, owing to its rich biodiversity, and a gold mine of medicinal knowledge. It is the second largest exporter of medicinal

plants, next to China, in the world and a host to more than three hundred thousand herbal medicine preparations used in ancient healing systems such as Ayurveda, Unani and Homeopathy.

In India, a major volume of medicinal herbs come from wild sources. Unsustainable harvesting practices of medicinal plants from the wild often result in rapid degradation of the natural biodiversity and poor regeneration capacity. This in turn affects the production and supply of medicinal plants from forest areas and the quality of the raw materials.

An all-encompassing solution lies in cultivating these plants outside forest areas and as a part of existing farm lands. This would also enable farmers and farming communities to enhance their income and livelihood through crop diversification with the high-value medicinal plants.

### **MOST PROFITABLE MEDICINAL PLANTS IN INDIA**

- KUTKI,
- SHATAVARI and
- CHIRAYATA

Conservation International has identified 34 biodiversity hotspots (the term was coined by British biologist Norman Meyers in 1988) with high levels of species endemism (>1500 species) and biodiversity depletion (70% of original habitat destroyed), 2 of them (Eastern Himalaya and Western Ghats) which are rich repositories of MPs are in India ([www.biodiversity.org](http://www.biodiversity.org)). The species wealth in these two hotspots is fast depleting and unless urgent corrective measures are initiated many of the species will soon become extinct.

Seventy percent of global plant species are threatened with extinction, of these 15000 species are MPs. Out of the 77000 MPs used worldwide 3000 MPs are internationally traded, only 900 species are cultivated and rest of the species are gathered from their natural homes.

### **NUMBER OF MPs PRESENTLY USED WORLDWIDE**

Globally 77000 plants (18.2% of the total plant species) are currently put to use for medicinal purposes. It has been established that majority of the Indian plant species possesses medicinal properties. In some of the Indian States >50% of the plant species are regarded as medicinal plants. Currently 900-1100 species are used for medicinal purpose in different Indian System of Medicine. This does not include the number of species used by forest dwelling tribal communities.

***Number of MPs threatened and cultivated globally***

<b>Number of flowering plants worldwide</b>	<b>422000</b>
Number of plants threatened (70%)	295400
Number of MPs (17.1%)	77000
Number of MPs threatened (20.8%) globally	15000
Number of MPs traded globally (4.2%)	3000
Number of MPs cultivated (1.3%) internationally	900

**Conservation and Protection Strategies for MPs**

Conservation is biodiversity management for human utilization to give sustainable benefit to the present generation while retaining its potential to meet the requirements and aspirations of future generations as well.

In situ and ex situ conservation strategies as described in following table need to be vigorously pursued by all the nations irrespective of their biodiversity status. Globally 115000 conservation and protection areas covering 12% of the land area have so far been created but need further strengthening. Similarly oceans, rivers, rivulets, tanks, springs, and other water bodies and wetlands also need to be protected for preserving their biodiversity. According to Botanical Survey of India, the Government of India has created 18 Biosphere Reserves, >28 Tiger Reserves, >97 National Parks (1.2% land area), about 500 Wildlife Sanctuaries and several several thousand Vana Rakshana Samithies (Forest Protection Councils) comprising communities dwelling in the forests and forest fringe areas to conserve and protect Indian biodiversity. A number of state governments have created MPs conservation areas each covering 200 hectares of forest cover.

**IN SITU and EX SITU STRATEGIES TO CONSERVE and PROTECT MPs**

<b>IN SITU CONSERVATION</b>	<b>EX SITU CONSERVATION</b>
<b>Medicinal plant conservation areas</b> <b>Biosphere reserves</b>  <b>National parks</b> <b>Sacred groves</b> <b>Cultivation in forests: Joint Forest Management</b> <b>Legislation: Banning exports, converting forests for agriculture or commercial purposes such as mining</b>	<b>Herbal gardens, theme parks</b> <b>Social/urban forestry, avenue plantations</b> <b>Cultivation of specific species</b> <b>Gene banks: Seed, pollen, DNA</b> <b>Tissue culture repositories</b>  <b>Cryopreservation</b>

## GLOBAL ECONOMIC SIGNIFICANCE OF MPS

The widespread use of MPs, their extracts, formulations and chemicals derived from them in different traditional and modern systems of medicine, nutraceuticals, cosmeceuticals, functional foods etc. is increasing the demand for herbal plants internationally. Following table provides an insight about the economic importance of MPs, their derivatives and products.

*Global Herbal Medicines Market Report 2023: A US\$248.6 Billion Market by 2030-Aswagandha Emerges as the Star Performer.*

### ECONOMIC POWER OF MPs

International market for traditional therapies	US\$ 135.8 billion in 2022
World market for herbal medicines, herbal products and raw materials	US\$ 43 billion in 2000
Global market for herbal teas	US\$ 100 million
World market for nutraceuticals	US\$ 75 billion
International market for functional foods	US\$ 57 billion
Chinese trade in traditional medicines	US\$ 103394.89 in 2023
Germany's herbal market	1,003 Euros in 2022
Indian traditional medicine market	US\$ 18.1 billion in 2023

China, India, USA, Germany, Canada are the major exporting countries.

USA, China/Hong Kong, Germany, Japan, France are the major importing nations.

### Medicinal Botanical Sources:

#### a. WORLD:

-70-(90) % of the species are collected from their natural habitats.

-50-(70) % of the MP biomass is from wild collections

#### b. INDIA:

-77% of MPs are collected from natural habitats: Temperate forests: 12%; Tropical forests: 40%; Roadsides: 25%; Cultivated: 20%; Imported: 3%.

-72% of MPs are collected in destructive manner seriously affecting natural propagation of MPs populations.

Traders exporters exploit local communities for collecting MPs from forests ignoring CITES (Convention on International Trade in Endangered Species of

Wild Flora and Fauna) guidelines leading to fast biodiversity degradation, revenue loss to governments, seriously eroding livelihood options of forest dwelling tribal communities and is against the spirit of Convention on Biological Diversity (CBD) objectives (conservation of Biological Diversity, Sustainable use of biological resources and fair and equitable utilization of genetic resources).

Governments of exporting nations should initiate practicable methodologies to protect the interests of these communities and MPs from overexploitation. The urgent need is to educate and train the local communities to regulate collections following the guidelines provided by:

- **International Standard for Sustainable Wild Collection of Medicinal Plants (ISSC-MAP);**
- **WHO Guidelines for Good Agricultural and Collection Practices for Medicinal Plants;**
- **WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants.**

### **THREATS and OPPORTUNITIES**

With the signing of GATT (General Agreement on Trade and Tariffs) by more than 100 countries markets have opened up for international companies and intellectual property protection (IPR) issues have become a serious problem to protect indigenous knowledge on MPs and their traditional use from biopiracy. India has successfully digitized 220268 medicinal formulations employed in different systems of medicine (see following table) through TKDL (Traditional Knowledge Digital Library) project (<http://www.csir.res.in>).

**Number of formulations of Indian medicine systems digitized by CSIR**

<b>Traditional Indian Medicine System</b>	<b>Number of formulations</b>
<b>Ayurveda</b>	<b>85500 formulations</b>
<b>Unani</b>	<b>120200 formulations</b>
<b>Siddha</b>	<b>13470 formulations</b>
<b>Yoga</b>	<b>1098 postures</b>
<b>TOTAL</b>	<b>220268 medicinal formulations</b>

The demand for wild as well as cultivated MPs and their products is increasing globally providing opportunities for biodiversity rich developing nations to utilize their natural resources prudently and innovatively to earn foreign exchange through exports of crude drugs and value added products and to create jobs for

both unskilled and skilled youth. Trained persons as well as scientific knowledge is must for the collection of MPs from wild. Conservation of biodiversity and protection of indigenous knowledge is an important aspect that needs to be addressed to prevent biopiracy.

Cultivation of MPs is emerging as an economic opportunity which needs to be utilized judiciously. Governments need to devise practically viable policies for protection and sustainable utilization of biodiversity and wealth creation through this bio-resource.

### ***Declaration***

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