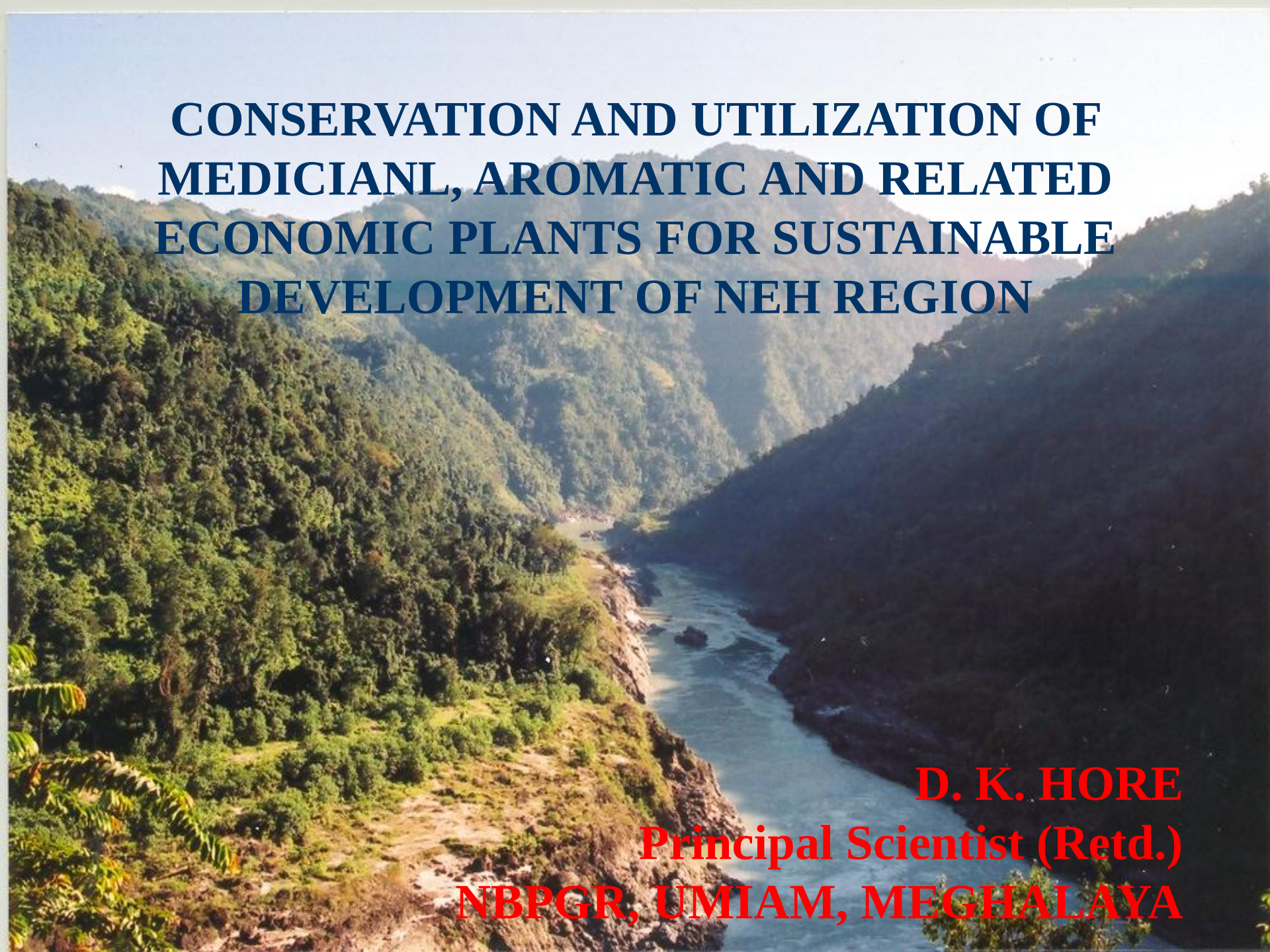
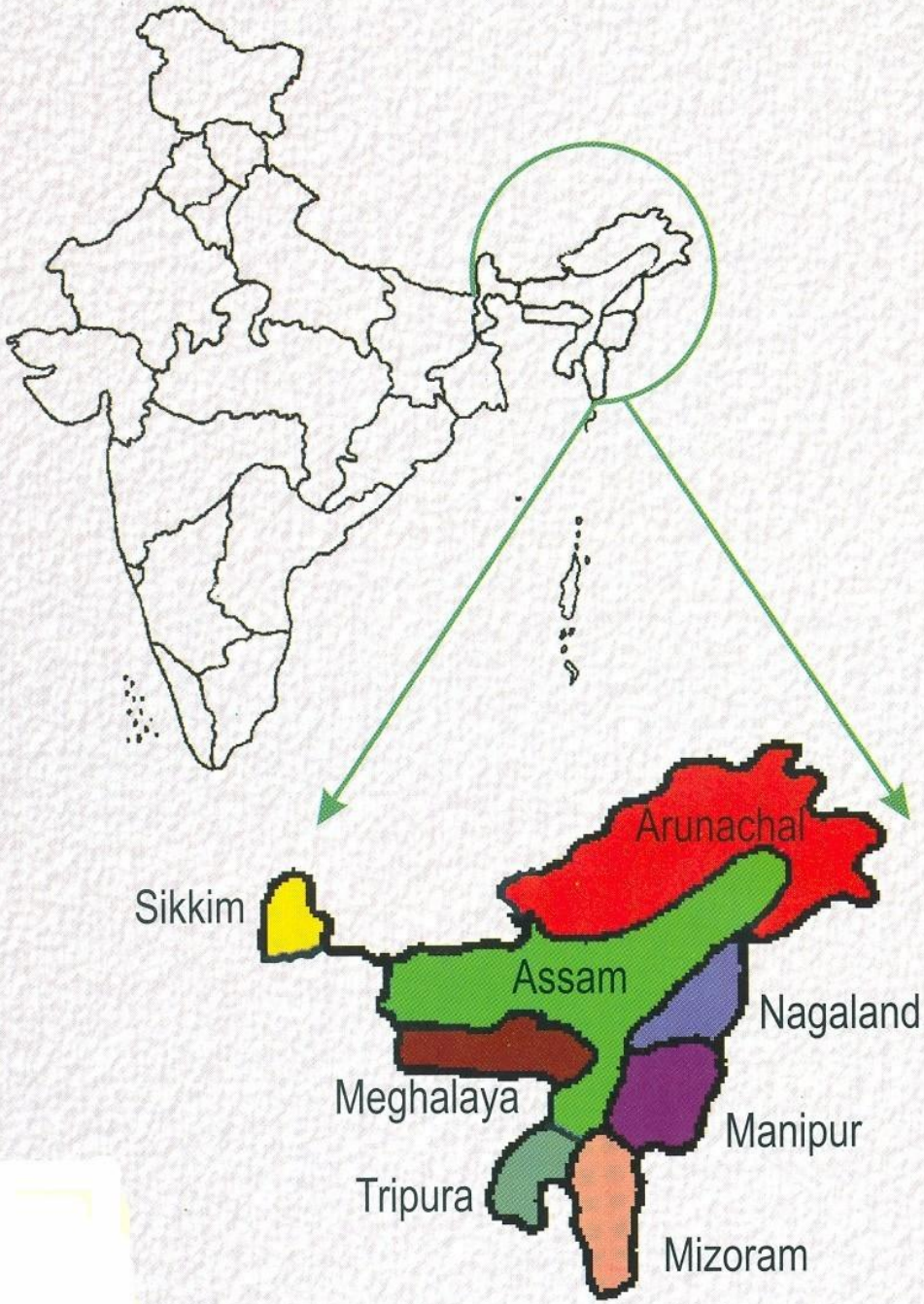
CONSERVATION AND UTILIZATION OF MEDICIANL, AROMATIC AND RELATED ECONOMIC PLANTS FOR SUSTAINABLE DEVELOPMENT OF NEH REGION



D. K. HORE
Principal Scientist (Retd.)
NBPGR, UMIAM, MEGHALAYA


Arunachal
Sikkim
Assam
Nagaland
Meghalaya
Manipur
Tripura
Mizoram

NORTH EAST INDIA

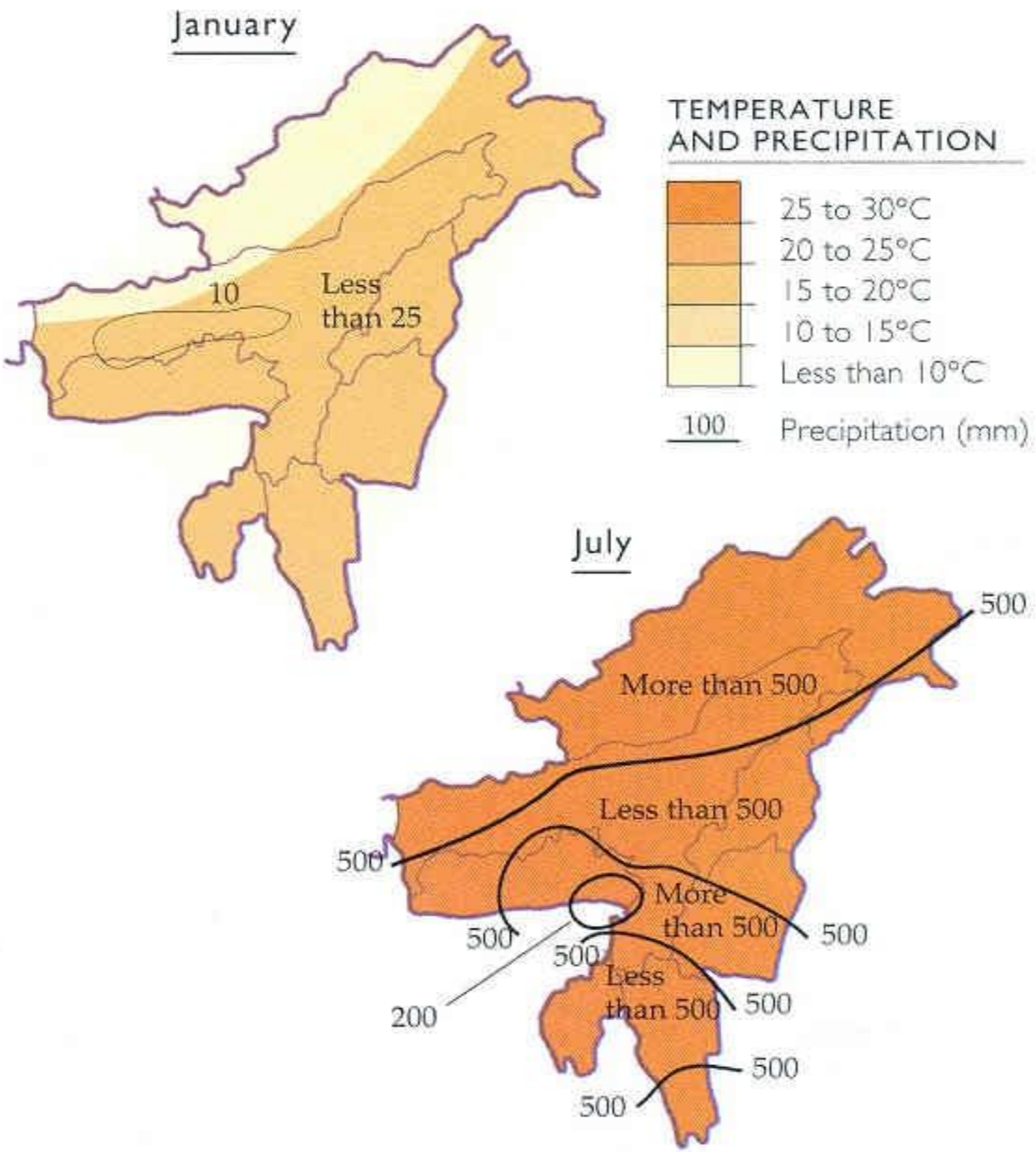
STATES	:	8
DISTRICTS	:	72
VILLAGES	:	9945
FLORISTIC PERCENTAGE	:	43% of Total Indian flora

PHYSIOGRAPHY

ENVIRONMENT-BASED ON CLIMATE AND ALTITUDE

- TROPICAL : (0 – 500m)
- SUB-TROPICAL: (500 – 2000m)
- TEMPERATE : (2000 – 3000m)
- ALPINE :(Beyond 3000m)

TREND IN TEMP. & RAINFALL



World Health Organization (WHO)

Medicinal Plant Species

- **World :20,000**
- **India :2,500**
- **Documented :7,500**
- **Frequently used in ISM & H :1,100**
- **Commonly used in Ayurveda :500**
- **No. of units engaged in manufacturing plant based drugs :700 (covering around 14,000 recipes)**

BASIC FACTS ON MEDICINAL PLANTS IN NE REGION

i) Percentage of Indian flora in NE Region	:	43 %
ii) Medicinal plant species in forest areas	:	70 %
iii) Remaining in non-forest land	:	30 %
iv) Harvested for marketing	:	5 %
v) Threatened medicinal plant species	:	10 %

COMPONENT OF USEFUL MEDICINAL AND AROMATIC PLANT AT DIFFERENT ENVIRONMENT

Tropical : ***Adhatoda vesica; Andrographis paniculata; Aquillaria agallocha; Centella asiatica; Dioscorea alata; Ocimum basilicum; Plantago erosa; Withania somnifera; Vitex negundo; Paedaria foetida; Cryptolepis buchanani; Acorus calamus.***

Subtropical : ***Artemisia maritime; Hydnocarpus kurzii; Lavendula vera; Litsea cubeba; Mucuna pruriens; Pogostemon calelin; Zanthoxylum armatum; Curcuma caesia; Leonotis nepetaefolia.***

Plants of *Leonotis nepaetifolia* R. Br.

***Clerodendron colebrookianum* – A medicinal plant**

Temperate : *Coptis teeta; Geranium nepalensis; Panax pseudoginseng; Swertia chirata; Picrorrhiza kurooa; Satyrium nepalensis; Rubia cordifolia; Taxus baccata, Orchis latifolia.*

Alpine : ***Aconitum ferox; A. heterophyllum; Illicium griffithii; Berberis* spp.; *Podophyllum hexandrum; Rheum emodi; Delphinium subulatum.***

***Rheum emodi* – A high altitude medicinal plant**

WHY CULTIVATE MEDICINAL PLANTS

- To ease pressure on natural resources
- To make available fresh, genuine and quality raw material for manufacturing of standardized and efficacious drugs
- To evolve better strains and high yielding crops of medicinal plants through improvement programmes and tissue culture techniques
- To check the use of spurious substitutes and adulterants which have resulted in the deterioration of the standard of drugs of ISM
- To standardize the collection, storage and post harvest technology for medicinal plants
- To provide regular and alternative source of income to the farmers for amelioration of their economic conditions
- For introduction and domestication of useful exotic drug plants to minimize import and maximize export
- To conserve the biological and genetic diversity in medicinal plants for the posterity.

ETHNIC KNOWLEDGE: DIVERSE USES IN HEALTH CARE

Uses	Number of species	Uses	Number of species
Anti Fertility	18	Blood Cholesterol	16
Stress Control	17	Anti Bacterial	26
Cardio Vascular	17	Anti Viral	11
Hypertension	21	Anti Protozoal	13
Blood Sugar Control	25	Anti Fungal	9
Respiratory Diseases	33	Galactogogue	10
Liver Function	33	Anti Ageing	10
Gastro Intestinal Disorder	40	Analgesic	18
Urinogenital Disorder	26	Vitality Enhancer	30
Anti Cancer	21		

PROPAGATION TECHNIQUES

- **Seeds (Direct or Nursery bed).**
- **Vegetative parts (Roots, Cuttings, Sucker, Corm, Rhizome, Bulb).**
- ***ex* plants establishment from tissue culture**

EXAMPLES OF MEDICINAL PLANTS PROPAGATED THROUGH SEED

- ***Albizia procera* Benth.**
- ***Ophiorhiza mungos* Linn.**
- ***Artemisia maritime* Linn.**
- ***Plantago erosa* Wall.**
- ***Bixa orellana* Linn.**
- ***Bridelia stipularis* Bl.**
- ***Picrorhiza kurrooa* Royle.**
- ***Taxus baccata* Hook. f.**

EXAMPLES OF MEDICINAL PLANTS PROPAGATED THROUGH CUTTINGS

- ***Dichroa febrifuga* Lour.**
- ***Artemisia maritime* Linn.**
- ***Cryptolepis buchanani* Roem. & Schult.**

EXAMPLES OF MEDICINAL PLANTS PROPAGATED THROUGH SPECIALIZED STRUCTURES

- *Alisma aquatica* Linn. (suckers)
- *Caladium bicolor* Vent. (suckers)
- *Kyllingia nemoralis* J.R. & G. Frost (suckers)
- *Potentilla sundaica (*Bl.) O. Kuntz. (suckers)
- *Alpinia galanga* (rhizome)
- *Coptis teeta* Wall. (rhizome)
- *Dioscorea alata* Linn.(tubers)
- *Campylandra aurantiaca* Baker (bulb)

← Plants of *Curcuma caesia*

Rhizomes of *Curcuma caesia* →

Kaempfaria galanga – an important medicinal plant

POTENTIAL SCOPE FOR CULTIVATION

80% people from developing countries depend on herbal medicine.

25% medicines are plant derived drugs (Fransworth & Soejarto, 1991)

World Trade : $ 70 billion (US)

Growth rate : 7% per annum (Gera et al., 2003).

NE REGION

120 Species of Medicinal plant

COMMERCIAL IMPORTANCE

Pharmaceutical Industry

1) *Rouvolfia serpentina*
2) *Dioscorea deltoidea*
3) *Curcuma* **spp.**
4) *Withania somnifera*
5) *Acorus calamus*

ANTIFERTILITY DRUGS

1) *Berberis aristata*
2) *Picrrorrhiza kurroa*
3) *Artemisia maritima*
4) *Aconitum ferox*
5) *Podophyllum hexandrum*

ANTIMALARIAL PROPERTY

1) *Coptis teeta*

AROMATIC PLANTS

Agar – ***Aquillaria agallocha***

Patchouli – ***Pogostemon patchouli***

Palmarosa – ***Cymbopogon martinii***

Mint – ***Mentha* spp.**

Vetiver – ***Vetiveria zizanoides***

Geranium oil (Rose scented) – ***Pelargonium graveolens***

Tezpat – ***Cinnamomum tamala***

STATUS OF CULTIVATION

Arunachal Pradesh : State Forest Department; CSIR stations; BSI field station; various NGO's at Roing, Itanagar, Chowkham, Ziro, Dirang, Lohit (Bordumsa).

Assam : Assam Valley Agotech Pvt. Ltd.; NEDFi at Khetri; RRC (Ayurveda); Gauhati University; various organisations at Golaghat, Dhemaji Districts.

Meghalaya : BSI, Shillong; NBPGR, Umiam; Biochemistry Deptt. (NEHU); Forest Deptt.; Herbalists at Smit, Nongstoin.

Tripura : State Forest Department.

Mizoram : State medicinal plants Board; Mizoram Univ. (School of Forestry).

‘Dikki-ka-thong’ (IC-204263) – rhizome used in lung & liver ailments

Nagaland : SASRD, Medziphema.

Sikkim : BSI Circle; GBPHED; NGO at North Sikkim.

Manipur : No specific information available.

ISSUES AND SUGGESTIONS

- **Selection of priority species of medicinal plants. It should be market driven demand.**
- **Enhancement of population for endangered species.**

- **Development of Agrotechnique for wild medicinal plant species which are not known or insufficiently known.**
- **Farmers production →Cooperative marketing →Industry linkages → viable system for steady supply and utilisation.**

- Standardisation techniques for value added products.

- ITK (Indigenous technical knowledge) issues.

MARKETING BOTTLENECKS

- Lack of regulated market for raw materials
- Middleman and pharmatuetical industry keeps hold on the market price.
- Random extraction from the wild habitat, which declines the market price
- Buy back policy should be introduced at government level

CONSERVATION STRATEGIES

- ***In – situ* conservation**
- ***Ex – situ* conservation**
  - ➞ **Field gene bank**
  - ➞ **Seed gene bank**
  - ➞ ***In – vitro* conservation**
  - ➞ **Cryopreservation for recalcitrant seeds**

GENE BANK SEED STORAGE

Sl. No.	Type of Conservation	Temperature (oC)	Relative Humidity	Longevity (years)
1.	Short term	18-19	50	3-5
2.	Medium term	7-8	40	25-40
3.	Long term	-10	37	50-100

ISSUES ON IPR AND GERMPLASM MANAGEMENT

- **Preventive policy on matter of biopiracy.**
- **Awareness generation about the IPR issues at grassroot level.**

- **Biological diversity including genetic diversity shall be conserved, enhanced and sustainability used. Patents and other IPRs shall be supportive of and not run counter to this objective**
- **Access to genetic resources shall be subject to prior informed consent. Where granted, access shall be on mutually agreed terms**
- **Benefits arising from the commercial and other utilization of genetic resources shall be shared in a fair and equitable way upon mutually agreed terms, multilaterally or on a bilateral basis**

OPTION AND ADOPTION OF *SUI-GENERIS* SYSTEM HELPS THE REGION

- **Conservation of biodiversity**
- **Protection of traditional and indigenous knowledge**
- **Equitable system of benefit sharing, technology transfer and proper rewards**


THANKS