

# **Herbal Research and Development Institute, Mandal, Gopeshwar, Chamoli**

## **HERBAL ANALYTICAL LABORATORY**



**Sponsored by**  
Agricultural and Processed Food Products Export Development Authority (APEDA)  
Govt. of India and Govt. of Uttarakhand



## Introduction

Himalayan Medicinal Plants constitute high quality of active constituents in the form of secondary metabolites which are used in preparation of medicine by different traditional and modern medicinal systems. Most of the Himalayan Medicinal Plants are yet to be explored scientifically and keeping in view this fact, HRDI initiated a research project "Establishment of Herbal Analytical Laboratory" at Mandal, Gopeshwar in 2010 with financial support from Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Govt. of India and Govt. of Uttarakhand. HRDI is aimed at developing research and development facilities in the field of medicinal and aromatic plants sector in the State. This project was initiated with the following objectives:

## Objectives

- ▲ To develop common facility for quality testing of cultivated, rare and endangered wild medicinal and aromatic plants.
- ▲ To develop methods of micro-propagation for production of quality planting material of rare and threatened Himalayan medicinal plant species for mass scale cultivation.
- ▲ To promote entrepreneurship for export of medicinal and aromatic plants based on laboratory facilities.
- ▲ Identification of active constituents from the plants used in folk medicinal system and helped people in Herbal Product Development.

## Sophisticated Analytical Instrument Facility

Herbal Analytical Laboratory caters the need of research and developmental activities of HRDI and also provides services to common farmers, traditional healers, private entrepreneurs, NGOs, Universities and Research Institutions from all over the country. The Herbal analytical laboratory has the following research and development activities:

**FT-IR spectrometer (ABB Bomem, MB 3000):** To obtain an infrared spectrum of a solid and liquid and to determine functional groups in a molecule.

**HPTLC (Camag Linomat 5):** Quantification of bio-active compounds and to identify compounds and its purity in a given substance.

**HPLC (Dionex Ultimate 3000):** To identify, purify and quantify the bio-actives components from a mixture.

**ICP-MS (Perkin Elmer, Nexlon 300X):** To determine and quantify a range of metals and several non-metals in plant, soil and water samples at concentrations below part per trillion (10<sup>12</sup>).

**UV-Visible spectrophotometer (Single beam; Elico SL-159):** To measure absorption and to record percentage transmittance.

**Laminar Air Flow (MAC- MS-1162):** To pass sterile air across the working area continuously.

**Muffle furnace (Sonar MF):** Muffle furnace is used for formation of ash from plant sample before analysis.

**Water Purification system (Millipore Simens):** Production of RO and ultra-pure water for experimentation.

**Tissue culture racks (Ozone Biotech):** Racks are mainly used for the photoperiodic cycle for the micro-propagation of plants.

**Hardening chamber (Ozone Biotech):** Proper hardening of the cultured plants in aseptic condition.

## RESEARCH AND DEVELOPMENT ACTIVITIES

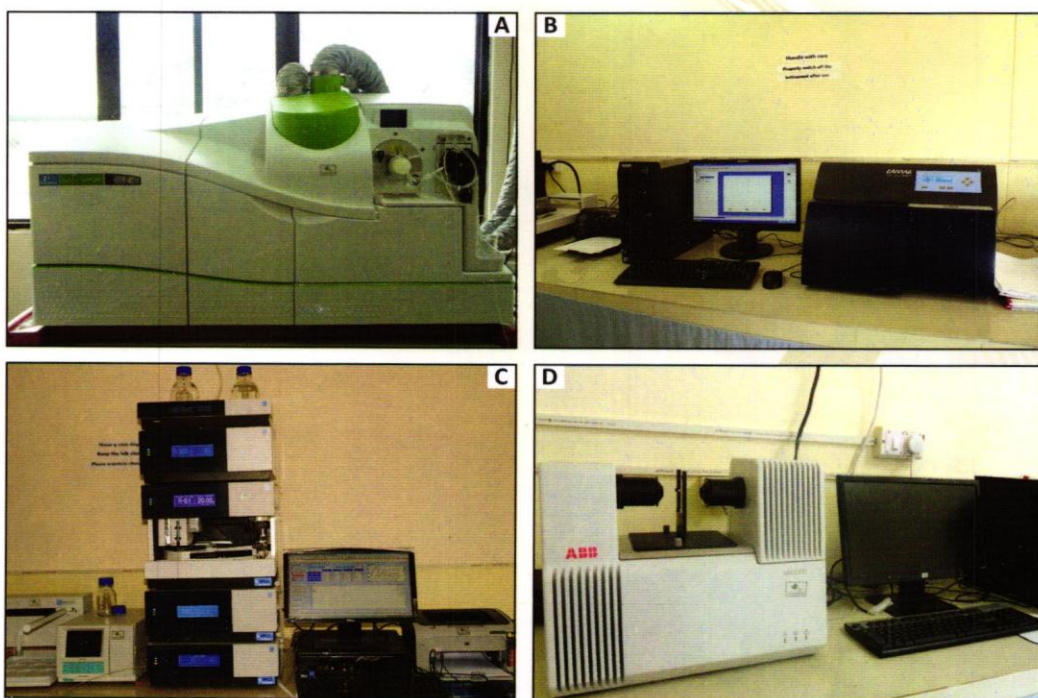
### Collection of medicinal plants

Samples of important medicinal and aromatic plants are being collected mainly from cultivated sources for their quality testing. However, some species were also collected from wild sources for isolation and quantification of secondary metabolites with a view to compare qualitative and quantitative data.

### Distillation of essential oil and extraction of chemical constituents

Essential oils were distilled from *Cannabis sativa*, *Hyssopus officinalis*, *Rosemarinus officinalis*, *Lavendula officinalis*, *Mentha piprita*, *Cinnamomum tamala*, *Tagetes minuta*, *T. petula*, *Amomum subulatum*, *Hedychium spicatum*, *Thymus serpyllum*, *Saussurea costus*, *Cymbopogon flexuosus*, *Artemisia annua* etc. using hydro-distillation method. Analysis of chemical constituents from some of the essential oils were also carried out.





A. ICP-MS, B. HPTLC, C. HPLC, D. FT-IR

### Extraction and quantification of bioactive compounds

Biologically active constituents and mineral elements from different samples of *Saussurea costus*, *Picrorhiza kurrooa*, *Rauvolfia serpentina*, *Digitalis lanata*, *D. purpurea*, *Veleriana wallichii* etc. have been quantified by HPLC, HPTLC and ICPMS.

### Seed germination study of Kapoor Kachri (*Hedychium spicatum*)

*Hedychium spicatum* is an important species for commercial cultivation in Uttarakhand but the percentage of seed germination is very low. Owing to this, experimentation was carried out to enhance its seed germination using different plant growth hormones in different concentrations. Using these modern techniques, the percentage of seed germination was observed from 52-90%.

### Tissue culture of important medicinal plants

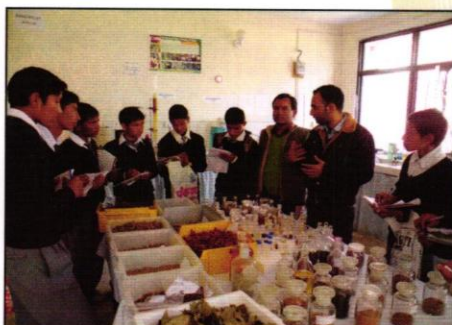
There are possibilities of micropropagation of many commercial species like Large Cardamun (*Amomum subulatum*), Chirayita (*Swertia chirayita*), Brahmi (*Centella asiatica*), Timaroo (*Zanthoxylum alatum*) etc. are under *in-vitro* experimental conditions.

### Screening of antimicrobial activity

Antimicrobial activity of *Rauvolfia serpentina*, *Saussurea costus*, *Berberis asiatica*, *Swertia chirayita* etc. were carried out against different bacterial strains such as *Salmonella typhimurium*, *Escherichia coli*, *Citrobacter freundii*, *Proteus vulgaris*, *Enterococcus faecalis* and *Staphylococcus aureus*. Among these species *Rauvolfia serpentina* showed significant antimicrobial activity.



Farmers' training on distillation unit



Visit of school students

