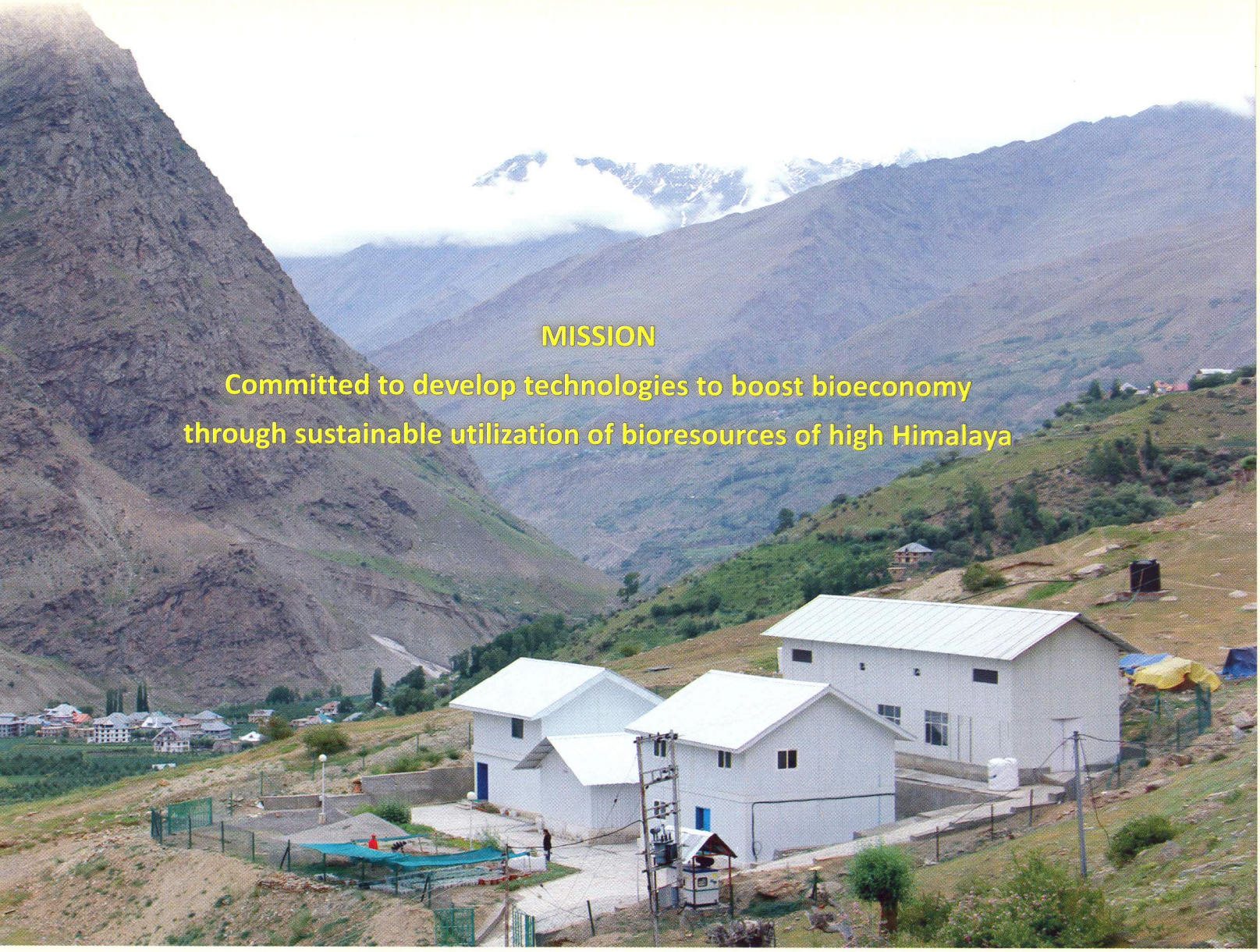
Research in the high Himalaya

CeHAB

A Unit of CSIR-Institute of Himalayan Bioresource Technology



MISSION

Committed to develop technologies to boost bioeconomy through sustainable utilization of bioresources of high Himalaya

Center for High Altitude Biology

Ribling, P.O. Tandi, Lahaul & Spiti - 175 132

Site office & Laboratory: Near DIET, Tandi, Lahaul & Spiti

Himachal Pradesh, INDIA

The National Action Plan on Climate Change by the Prime Minister's Council on Climate Change has a National Mission for sustaining the Himalaya Ecosystem. Appreciating the strategic national requirement in global context, a world class centre has been established at Ribling (Tandi, Distt. - Lahaul & Spiti, Himachal Pradesh) to undertake research on bioprospection of bioresource for ecology, economy and society of high Himalaya through fundamental and industrial research.

Laboratory Complex

Objectives

To study and predict the impact of climate change on high altitude ecosystems of Himalaya

Conservation and characterization of genetic resources of high altitude for value addition, empowering for societies through innovation, diffusion of technology and high altitude biology of plants and microbes

Infrastructure

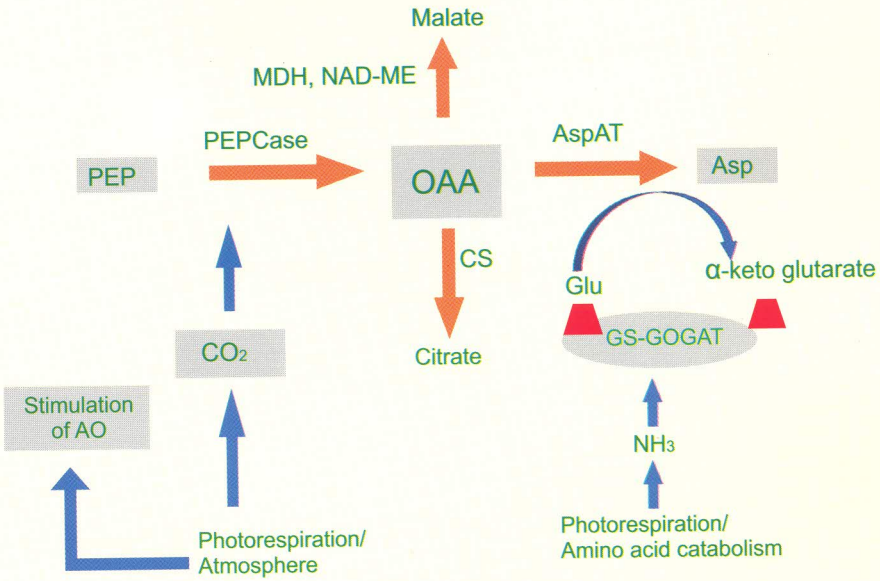
- Long Term Ecological Research plots
- Environmental data tower
- Farm and polyhouse facilities
- Plant and soil analysis lab
- Plant tissue culture facility
- Food processing facility
- Essential oil extraction unit
- Pilot plant for post harvest management
- Training center

Functions

- *In situ* and *ex situ* conservation of high altitude plants of importance
- Bioprospection and bioresource generation
- Climate change impact studies
- Evolving models for high altitude ecology
- Extension activities, training and capacity building

Training of villagers from Lahaul Spiti at CeHAB

A novel mechanism of CO_2 fixation at high altitude



Picrosides biosynthesis pathway

MEP Pathway

Pyruvate + Glyceraldehyde-3-phosphate

1-deoxy-D-xylulose-5-phosphate synthase

1-Deoxy-D-xylulose-5-P

1-deoxy-D-xylulose-5-phosphate reductoisomerase

2-C-Methyl-D-erythritol-4-P

2-C-methylerythritol 4-phosphate cytidyl transferase

4-(CDP)-2-C-methyl-D-erythritol

4-(cytidine-5'-diphospho)-2-C-methylerythritol kinase

4-(CDP)-2-C-methyl-D-erythritol-2-P

2-C-methylerythritol-2,4-cyclophosphate synthase

2-C-methyl-D-erythritol-2,4-cyclo-PP

1-hydroxy-2-methyl-2-(E)-butenyl-4-diphosphate synthase

1-Hydroxy-2-methyl-2-(E)-butenyl-4-PP

1-hydroxy-2-methyl-2-(E)-butenyl-4-diphosphate reductase

Dimethylallyl pyrophosphate

MVA Pathway

Acetyl coenzyme A

acetoacetyl CoA thiolase

Acetoacetyl coenzyme A

3-hydroxy-3-methylglutaryl coenzyme A synthase

3-Hydroxy-3-methylglutaryl coenzyme A

3-hydroxy-3-methylglutaryl coenzyme A reductase

Mevalonate

mevalonate kinase

Mevalonate phosphate

phosphomevalonate kinase

Mevalonate pyrophosphate

mevalonate-5-pyrophosphate decarboxylase

isopentenyl pyrophosphate isomerase

Isopentenyl pyrophosphate

geranyldiphosphate synthase

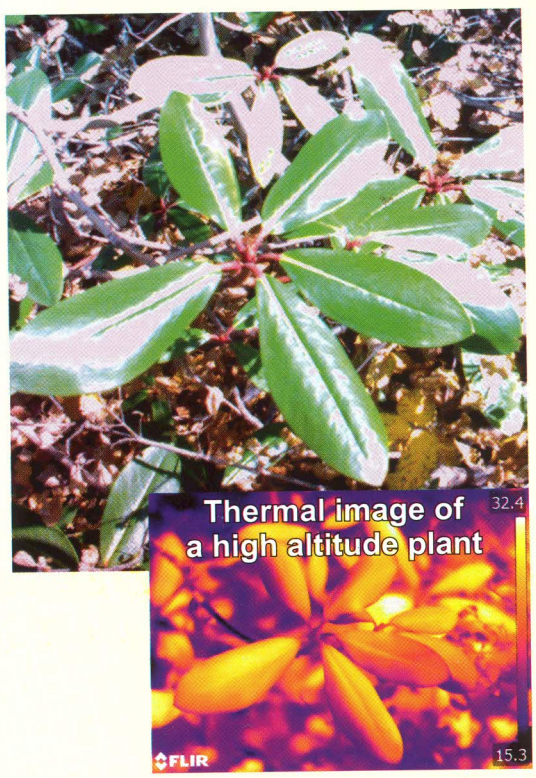
Geranyldiphosphate

Cinnamate/ vanillate (from phenylpropanoid pathway)

Iridoid moiety

Glucose

Picrosides



Achievements of high altitude biology research

Developed ten Long Term Ecological Research plots for monitoring vegetation in treeline zone

Developed spatio-temporal vegetation and biomass maps using RS-GIS

Studied the impact of altitude and temperature on picroside metabolism in *Picrorhiza kurrooa*

Propounded a novel carbon sequestering pathway and nitrogen utilization mechanisms

Identified key genes responsible for imparting biotic and abiotic stress tolerance in plants

Introduced commercial floriculture in Lahaul valley

Established a germplasm resource centre for sea buckthorn (*Hippophae rhamnoides)*

Established demonstration plots of *Picrorhiza kurrooa, Aconitum heterophyllum* and *Crocus sativus* (saffron), Panax spp. etc.

Societal activities at high altitude

Lilium cultivation

Saffron cultivation at Pangi

Picrorhiza kurrooa cultivation

Trillium govanianum

Folder design by Pabitra Gain, CSIR-IHBT, Palampur.

Contact

Director

CSIR-Institute of Himalayan Bioresource Technology

Palampur, Post Box No. 6, Himachal Pradesh-176 061, India

Ph: +91 1894 230411, Fax: +91 1894 230433,

Email: director@ihbt.res.in; Website: http://ihbt.res.in