



18.09.2020

**Subject: Lok Sabha Unstarred Question Dy. No. 8486 for 24.09.2020
regarding Health and Safety of labourers – reg.**

a) The details of the rules and guidelines at the work places for the health and safety of the labourers; and

All the guidelines as issued from time to time by the Competent Authorities and obligations of the principal employer towards health and safety for contractual workers are followed.

It is further submitted that health and safety facilities like availability of safety gears, face masks, hand gloves & sanitizers etc. for the contractual workers are at par with regular employees of this Institute.

b) The ministry-wise details of the amount spent by the Government to ensure the health care of the labourers?

An annual expenditure of Rs. 8,00,000/- towards reimbursement of ESIC contribution by employer are made against deployment of 220 numbers (subject to variation depending upon requirement of the Institute) contractual workers.

Subject: Reply to Parliament Question (Lok Sabha) Diary No. 2473 for 05.02.2021 regarding "Herbal Gardens" reply reg.

a) Whether the Central Sector Scheme for Conservation, Development and Sustainable management of Medicinal plants is being implemented in the country;

- The National Medicinal Plants Board under the AYUSH ministry has this mandate.
- The Ministry of Environment, Forest and Climate Change provides assistance for setting up of botanical gardens that includes medicinal Plants.
- The CSIR through its themes and missions (e.g Agri nutri Biotech, Phytopharma) is catering to the above.

b) If so, the details thereof along with the number of herbal gardens functioning in the country including Maharashtra and Tamil Nadu;

- Herbal garden at CSIR-IHBT, Palampur (H.P.) with 86 plant species comprising 24 vatshamak, 31 pitshamak and 31 kaphashamak ayurvedic plants.
- Herbal garden established by CSIR-IHBT at Civil Hospital, Palampur (H.P.) with 24 species of medicinal plants.

Given below are the activities undertaken by the Institute on cultivation, characterization and value addition of herbs, where training is also an important component:

- Heeng (*Ferula asafoetida*) is one of the top condiment and medicinal plant traded in India. India imports about 1540 tonnes of raw asafoetida annually from Afghanistan, Iran and Uzbekistan and spends approximately Rs942 crores per year on import of asafoetida (2019).With the goal to achieve self-sufficiency in asafoetida production through wide spread cultivation in India, CSIR-IHBT introduced Heeng seeds (six accessions) for the first time in the country from Iran through ICAR-NBPGR, New Delhi in October 10, 2018 vide import permit Nos. 318/2018 (July 25, 2018) & 409/2018 (September 12, 2018).The Institute raised the plants of Heeng at Center for High Altitude Biology (CeHAB), Ribling, Lahaul&Spiti, H.P. under the vigil of NBPGR.Dr. Sanjay Kumar, Director, CSIR-IHBT initiated the asafoetida cultivation program by planting asafoetida seedlings at village Kwaring of Lahaul valley (HP) on 15 October 2020.Further, CSIR-IHBT scientists also organized training programs on asafoetida cultivation and laid out asafoetida demonstration plots in villages of Madgran, Beeling and Keylong in Lahaul

valley of Himachal Pradesh in collaboration with officers of State Agriculture Department for establishment of seed production chain and cultivation of asafoetida on commercial scale. Heeng has also been planted at Kataru, Majhakhali, Janjehli and Ghayan in district Mandi; and Mebar, Kothi, Dumni, ReckongPeo and Powari in district Kinnaur. Secretary DSIR & Director General, CSIR, Dr. Shekhar C. Mande planted the first plant of Heeng in Janjehli on 8th Nov, 2020 to mark cultivation of Heeng for the first time in District Mandi of Himachal Pradesh.

- Saffron (*Crocus sativus* L.) is the most expensive spice of the world. The annual demand for this spice is 100 tons per year but its average production in India is about 6-7 tons and hence a large amount of the spice is imported. With an objective to extend the saffron cultivation beyond Kashmir, CSIR-IHBT started working on saffron from 2015 onwards to develop disease free corms production technology through tissue culture & identifying the suitable locations in India. CSIR-IHBT standardized agro-technology for the introduction of this crop in non-traditional areas of Himachal Pradesh, Uttarakhand, North East and Leh. CSIR-IHBT identified different locations across the western Himalayas through the MAXENT model having the potential to cultivate saffron. Initial experiments conducted in the non-traditional areas of H.P. and Uttarakhand yielded promising results from some locations of districts Chamba, Kinnaur, Mandi and Kangra in Himachal Pradesh and Bageshwar of Uttarakhand state. Quality of the produce was tested in the laboratory of CSIR-IHBT and it was found to be at par with the quality of Kashmiri saffron and in some aspects viz., amount of crocin and picrocrocin it was even better.
- Also, Institute introduced sweetener crop Monk Fruit (*Siraitia grosvenorii*) for the first time in the country, as potential low-calorie natural sweetener, 300 times sweeter than sucrose.
- Institute has been actively engaged for development of quality standards for important phytochemicals from the Himalayan medicinal plants such as *Cissampelos pareira* and *Trillium govanianum*.
- The TKDL programme of CSIR targeted digitizing information on medicinal plants including plants used in Ayurveda.
- Under CSIR Phytopharmaceutical mission, 21 medicinal herbs were targeted to bring more than 300 ha under captive cultivation in a coordinated manner at different CSIR institutes to meet the industrial demand for high quality raw botanical drug. Efforts are also going for revival more than 25 RET (rare, endangered and threatened) high value plants. As stated previously, the institute under this mission is pursuing captive cultivation of selected Himalayan medicinal plants used in Ayurveda (such as *Saussurea lappa*, *Inularacemosa*, RET Himalayan plant species (*Picrorhiza kurroa*, *Podophyllum hexandrum*, *Trillium*

govanianum and *Fritillaria roylei*). Survey, collection and characterization have also been undertaken for these RET medicinal plants species.

- Also, under in-house programmes, CSIR-IHBT has been promoting cultivation and processing of herbals in Himachal Pradesh. The institute has developed agrotechniques and new cultivars of important Himalayan crops such as *Hedychium spicatum* (Him Kachri), *Valeriana jatamansi* (Him Bala & Him Surbhit) and *Curcuma aromatica* (Him Haldi). For ex-situ conservation of Himalayan species, the institute has established conservatories and botanical gardens that hold ~200 species. CSIR-IHBT also introduced Russian varieties of Seabuckthorn *Altaiskaya* and *Gnom* which are upto five times higher yielding than Indian Seabuckthorn.
- In addition, the institute this year raised about 50,000 seedlings of medicinal plants (*Aconitum heterophyllum*, *Saussurea costus*, *Inula racemosa* and *Picrorhiza kurroa*) at Lahaul for growing there.
- Conservation and sustainable resource generation of high altitude bioresources is being done at CSIR-Centre for High Altitude Biology, Ribling, Keylong, Lahaul & Spiti district. This centre maintains germplasm of *Trillium govanianum*, *Aconitum heterophyllum*, *Picrorhiza kurroa*, *Fritillaria roylei*, *Dactylorhiza hatagirea*, *Saussurea costus*, *Inula racemosa* etc. Characterization and consolidation of *Hippophae* genetic resources and propagation of elite genotypes for varietal evaluation is being done
- CSIR-IHBT is actively involved in research on population and distribution of medicinal plants, their extraction patterns, indigenous uses, and value chain. The institute is generating chemical and spectral signatures of medicinal plants
- Institute is also generating geo-tagged digital database for herbal plants.
- CSIR-IHBT has successfully completed development of the database on medicinal plants of the Indian Himalayan region. The database has been developed for National Medicinal Plants Board, Ministry of AYUSH, New Delhi in a network mode with Indian Institute of Integrative Medicine, Jammu; North East Institute of Science and Technology, Jorhat; and North Eastern Hill University, Shillong. The institute coordinated the project, which created the database containing information on about 1582 plant species of therapeutic value, including Ayurveda, dwelling in Indian Himalaya.
- For popularizing research on medicinal plants and their current status, CSIR-IHBT is engaged in ex-situ conservation of medicinal plants through setting up of herbal gardens at Palampur and Ribling located in Himachal Pradesh.

During 2020 following training programs has been conducted by CSIR-IHBT Palampur, HP for the farmers, unemployed youth, women and agriculture officers.

Date of training	Title of training	Trainee	Venue of training	Number of trainees
February 5-8, 2020	Training programme on hydroponics and aeroponics cultivation of herbal plants	Horticulture Development Officers, Dept. Horticulture, progressive farmers, unemployed youth, students from HP, UK and Gujra	CSIR-IHBT Palampur, HP	33
February 28, 2020	Awareness cum training program on improved agrotechnologies for cultivation of aromatic plants	Farmers of Baramulla, Jammu and Kashmir conducted at CSIR-IHBT	CSIR-IHBT Palampur, HP	25
February 24-25, 2020	Improved Agro and process technology of Damask rose	Industrialists Nagpur from Maharashtra (Paid training 12000)	CSIR-IHBT Palampur, HP	2
March 17, 2020	Awareness cum training programme on aromatic plants	Farmers of Puth, Garh Mukteshwar, Distt Hapur, UP	Village Puth, Garh Mukteshwar, Distt Hapur, UP	10
July 20-22, 2020	Capacity Building of Agriculture Officers, Department of Agriculture, HP on Production Technology of Saffron and Heeng	Agriculture officers of Department of agriculture, Govt. of HP from six districts of HP	CSIR-IHBT Palampur, HP	12
October 28, 2020	Training on agro and process technology of wild marigold	Schedule caste farmers, women and unemployed youth of	Village Parwai, Chowari block, Chamba HP	30

		aspirational district, Chamba, HP		
November 7, 2020	Training on agro and process technology of wild marigold	Tribal farmers of aspirational district Chamba, HP	Village Talla, Shiunta, Chamba, HP	50
November 8, 2020	Training on cultivation of saffron and Heeng	Farmers, women and unemployed youth	Janjehli, Mandi, HP	50
December 10, 2020	One day training cum exposure visit of farmers from Chowari, Chamba, HP	Schedule caste farmers, unemployed youth of aspirational district, Chamba	CSIR-IHBT Palampur	7
January 22, 2021	One day training programme on Heeng cultivation	Tribal farmers of Lahaul	Keylong, Lahaul & Spiti	34

- c) **If so, the details thereof including project based support to various government and non-government organizations to develop different types of herbal gardens in Maharashtra;**

Does not pertain to CSIR-IHBT, Palampur

- d) **whether under this scheme financial assistance as subsidy to farmers to promote farming of herbs/medicinal plants has been provided and if so, the quantum of financial assistance provided during each of the last three years; and**

Does not pertain to CSIR-IHBT, Palampur

- e) **the corrective measures taken by the government to further incentivize the program under the scheme?**

Does not pertain to us

29.01.2021

Subject: Reply to Loksabha question Dy. No. 2347 regarding "Internal Complaints Committee" – reg.

Sr. No.	Question	Answer
a	Whether all the Central Government Departments and PSUs have constituted Internal Complaints Committee (ICCs) against the backdrop of Sexual Harassment of Women at workplace (Prevention, Prohibition and Redressal) Act notified by Government of India, 2013;	Yes, Internal Complaints Committee has been constituted in this Institute.
b	If so, the details thereof and if not, the reasons therefore;	The Sexual Harassment committee has been constituted vide OM No. 2-2(24)02-Estt. dated 21-08-2018 and renamed as Internal Complaints Committee vide OM of even number dated 06-12-2019.
c	The total number of sexual harassment complaints filed, resolved and pending in the departments of the Central Government before the respective ICCs' since 2013;	1. One complaint received during the year 01-04-2014 to 31-03-2015 and disposed off successfully. 2. One complaint received during the year 01-04-2016 to 31-03-2017 and disposed off successfully.
d	Whether cooperative institutions in Kerala have constituted the ICCs to look into such cases;	Not pertained to this Institute.
e	If so, the details hereof, if not, the reasons therefore; and	Not pertained to this Institute.
f	Whether penalty for non compliance with provisions provided under Section 26 of the said Act have been imposed on employees and if so, the details thereof and if not, the reasons thereof?	Not pertained to this Institute.

Subject: Demands for Grants (2021-22) of the Department of Scientific and Industrial Research- reg Questionnaire -II

a) Details of the Department's project on cultivation of Asafoetida

A Niche Creating Project entitled, "Introduction, characterization and cultivation of *Ferula assa-foetida* (Hing) in cold desert regions of Indian Himalayas" on cultivation of Asafoetida in Himachal Pradesh is being undertaken at CSIR-Institute of Himalayan Bioresource Technology, Palampur.

Financial outlay towards this project

Total budget outlay of the project is Rs. 378.7 Lakhs (Rs. 152.58 Lakhs for 2020-21, Rs. 115.584 Lakhs for 2021-22 and Rs. 110.584 lakhs for 2022-23).

b) Proposed milestones across different phases of this initiative

- Introduction, identification of niche areas and adaptation of *Ferula assa-foetida* in cold desert regions of Indian Himalayas
- Morphological, chemical and molecular characterization of the germplasm
- Standardization of basic agro-technologies
- In vitro production of oleo-gum-resin using organ culture of *Ferula assa-foetida*

c) Is Department planning to expand this initiative to other states and other crops?

Yes, CSIR-IHBT is planning to expand cultivation of Hing in cold desert regions of Indian Himalayas such as Lahaul & Spiti, Kinnaur, Chamba and Mandi districts of Himachal Pradesh, Ladakh, parts of Jammu & Kashmir, Uttarakhand, Sikkim and Arunachal Pradesh which are suitable for cultivation of asafoetida. CSIR-IHBT has signed MOU with State Department of Agriculture, Himachal Pradesh on June 6, 2020 for a joint collaboration to promote cultivation of Hing in the State. The target is to cover 300 ha area under cultivation of Hing in Himachal Pradesh during next five years.

Already, correspondence with following organizations is in progress regarding cultivation of Hing:

1. Sher-e-Kashmir University of Agriculture Sciences & Technology (SKUAST-J), Chatha, Jammu, J&K 180 009
 2. Administration of Union Territory of Ladakh, Ladakh Autonomous Hill Development Council, Kargil
 3. Farmers from Garud, District Bageshwar, Uttarakhand
- d) **CSIR-IHBT is also promoting cultivation of following commercially important plants:**
- Saffron in Himachal Pradesh and Uttarakhand
 - Apple in North Eastern States (Manipur, Mizoram and Meghalaya)
 - Natural sweeteners (monk fruit in low hill regions of Himachal Pradesh, Uttarakhand, Sikkim and West Bengal; stevia in Punjab, Haryana, Rajasthan, Madhya Pradesh, Chhattisgarh, Maharashtra, Uttar Pradesh, Telangana, Karnataka and Himachal Pradesh)
 - Bamboo in Himachal Pradesh
 - Floriculture in Himachal Pradesh, Uttarakhand and Punjab
 - Medicinal and aromatic plants in Himachal Pradesh, Punjab, Haryana, Uttar Pradesh, Sikkim, Arunachal Pradesh, Manipur, Mizoram, Chhattisgarh, Odisha, Tamil Nadu and the Union Territories of Ladakh and Jammu and Kashmir.

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. S4277 reg.)

- a) **The details of steps Government has taken to maintain fragile and vital ecology of the Himalayas; and**

The **National Mission for Sustaining the Himalayan Ecosystem (NMSHE)** is being implemented by the Department of Science and Technology, Govt. of India. For this 6 task forces have been set up:

Task force	Nodal organization/agency
Natural and geological wealth	Wadia Institute of Himalayan Geology
Water, ice, snow resources Including glaciers	National Institute of Hydrology
Forest resources and plant biodiversity	Govind Ballabh Pant National Institute of Himalayan Environment (GBPNIHE)
Micro flora and fauna and wild life & animal population	Wildlife Institute of India
Traditional Knowledge Systems	Jawaharlal Nehru University
Himalayan Agriculture	Indian Council of Agricultural Research

The CSIR-IHBT is a part of the traditional knowledge systems.

The **National Mission on Himalayan Studies (NMHS)** is being implemented across the Himalayan states. It is being co-ordinated by the Ministry of Environment, Forest and Climate Change through the Govind Ballabh Pant National Institute of Himalayan Environment. *Under this mission, CSIR-IHBT is carrying out studies on conservation and management of Himalayan bioresources, community involvement, and waste management.*

The **Himalayan Alpine Dynamic Research Initiative (HIMADRI)** of the Department of Space, being co-ordinated by the Space Applications Centre, Ahmedabad targets alpine dynamics in fate of climate change in five Himalayan states (Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh). *Under this, CSIR-IHBT is mapping and characterizing alpine regions.*

As a part of its **core activities, CSIR-IHBT** is actively involved in characterizing species, mapping resources, documenting their spatial & temporal patterns vis-à-vis climate change. CSIR-IHBT is also focussing on Indigenous Knowledge Systems prevalent in the Himalaya. All these target maintaining the fragile ecology of Himalaya.

- b) Whether any monitoring mechanism has been set up to Strengthen any changes taking place in glaciers by inducting scientists also for consultation, if so, the details thereof and if not, the reasons therefor?**

This does not pertain to us. However, a task force “Water, ice, snow resources Including glaciers” under the NMSHE (DST) is looking after this.

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. S301) regarding "Mission Innovation"

e) Whether Government (CSIR) aims to promote Science and Technology with emphasis on emerging areas and their application for the development and support to the weaker sections of the society and if so, the details thereof.

- I. To disseminate the technology on bacterial consortia for rapid degradation of organic waste and generation of enriched compost, the project of Rs 4 crore 10 lakhs has been granted by Ministry of Ministry of Micro, Small & Medium Enterprises (MoMSME) under 'SFURTI' scheme at rural areas of HP and Sikkim. Under the project, the financial assistance will help in establishment of a CFC building comprising of a microbial culture room, bioreactor room, compost quality test room, training hall and model 20 concrete compost pits. The CFC will be equipped with all the advanced instruments including bioreactor (500 l), autoclave, laminar air flow, distilled water unit, BOD incubator, automatic kjeldahl apparatus, flame photometer, UV spectrophotometer, pH and conductivity meter, moisture analyzer, hot air oven etc. The scheme will benefit 400 cattle rearers and each of them will get toolkit worth Rs 28,600/-. With the implementation of this cluster apart from controlling the organic waste, the farmers are expected to earn additional Rs 30,000/- per year by selling enriched compost. The Triloki Enriched Composting/ Vermicomposting Cluster, Sirmour District, Himachal Pradesh State has 200 beneficiaries from the weaker section 28 SC, 172 ST. Likewise, in the other cluster at Sikkim, Moonew Tareybhair Enriched Composting /Vermicomposting Cluster, West District, Sikkim State, 122 beneficiaries belong to weaker sections (9 SC, 57 ST, 56 OBC).
- II. Two clusters at Gondla and Shansha in Lahaul has been sanctioned by Ministry of Micro, Small & Medium Enterprises (MSME) under 'SFURTI' scheme with CSIR-IHBT as a Technical Agency. The project of Rs 330.59 lakhs has been sanctioned for both the clusters with a Govt. of India grant assistance of Rs 317.48 lakhs. Under the project, the financial assistance will help in establishment of a CFC building, cold storage unit, drying conveyor tunnel, grading and sorting machines, tools for farmers with working capital. The clusters are aiming to benefit 351 farmers all belonging to SC/ST communities. This project will also increase the market window from 35 days to 90 days thereby, increase the margin of the farmers by 35%. Apart from this, there is a provision under soft-interventions for trainings on techniques of cold storage, grading and packaging, marketing, quality control, participation in local

trade fair, buyer-seller meet and launch of website in order to access larger market. The direct impact of this intervention will be an additional increase of Rs 36,000/- per year by selling liliium flowers and bulbs.

- III. To disseminate the technology on Vitamin D2 enriched Shiitake mushroom, institute has got the approval from National Small Industries Corporation Ltd. (NSIC) under National SC-ST Hub, Ministry of MSME, New Delhi. Under the programme it is proposed to undertake capacity building programme on Shiitake mushroom production at 15 Himalayan districts dominated with SC/ST populations.
- IV. Under CSIR-Aroma Mission, catalysed rural economy through cultivation of aromatic crops and made Himachal Pradesh the top state in the country in the production of wild marigold oil. 6.49 tonnes of high grade tagetes oil was produced during 2019-20 leading to revenue generation of Rs. 5.19 crores and benefitting 861 small farmers.
- V. Promoted cultivation of aromatic crops in ten states and two union territories through end-to-end technologies from supply of planting material, trainings on cultivation practices and processing of produce by extraction of essential oils from aromatic crops in the farmers' fields.
- VI. Empowered farmers through installation of forty-three field distillation units for extraction of essential oils, which were set up in the farmers' fields leading to empowerment of farmers of Chamba (the aspirational district of H.P.) and other districts of Himachal Pradesh, Jammu & Kashmir, Uttarakhand, Arunachal Pradesh, Manipur, Odisha, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Chhattisgarh and Tamil Nadu.
- VII. Area covered under cultivation of different aromatic crops was 538.45 ha which was promoted in waste lands, abandoned lands affected by wild animal menace and led to generation of 1,31,000 man-days. As per report of Third Party Assessment by National Productivity Council, New Delhi, cultivation of wild marigold resulted in farmer income of Rs. 94, 000/ha.
- VIII. CSIR-Floriculture Mission has been launched at the national level to provide support to farmers growing floriculture crops. Based on Third Party Assessment by National Productivity Council, New Delhi, cultivation of liliium by farmers in Lahaul & Spiti resulted in income enhancement by 5 times compared to traditional crops of peas and potatoes.
- IX. Integrating apiculture with floriculture and aromatic crops cultivation and utilizing CSIR improved bee hive for quality and hygienic extraction of honey
- X. The institute has introduced low chilling varieties of apple in North-East states, which was recognized by Govt. of Mizoram, North East Council, Shillong, Meghalaya. North East Council, Shillong, Meghalaya sanctioned one project entitled "Capacity building programmes for NERCORMP Communities on cultivation and post-harvest management of low chilling varieties of apple". In this project low chilling varieties of

apple were introduced in Manipur and Meghalaya during 2019-2020 in association with North Eastern Region Community Resource Management Project (NERCORMP). Low chilling varieties viz., Anna, Dosett Golden, Red Fuji, Early Fuji, Sun Fuji and pollinizer variety Scarlett Gala were introduced in Ukhrul district of Manipur and West Khasi Hills district of Meghalaya. Capacity building programmes were conducted to the officials of NERCORMP in CSIR-IHBT and in north east states. 110 farmers were trained under the capacity building programme. About 16 acres of area have been covered in different location till now. During 2020, North East Council funded a project to CSIR-IHBT for bringing 66 acres of area under low chilling varieties in Arunachal Pradesh and Meghalaya. CSIR-IHBT have supplied 25000 low chilling varieties of apple viz., Anna, Dosett Golden, Red Fuji, Early Fuji, Sun Fuji, Pink lady, Granny Smith and Scarlett Gala to NERCORMP, Meghalaya for plantation in farmers' field in North East during January 11, 2021. With a net returns of 3-3.5 lakh /ha apple could be hot substitutes to zhoom cultivation being practiced in north east states of India.

- XI. In case of training of students (Summer/ winter training-UG/PG/ Ph.D./ others trainees) at CSIR-IHBT, Palampur, a concession in training charges is being given on case to case basis after receiving request from economically/ socially weaker sections of society having annual income less than one lakh supported with valid income certificate issued by the Revenue Officer not below the rank of Tehsildar. The concessions/ waiver in fee is applicable only for 10 candidates on the basis of first come first serve i.e. from the date of receipt of application in the Institute". (Approved by Management Council of CSIR-IHBT).

Subject: Reply to Parliament Question (Rajya Sabha Q. No. 19) regarding.

a) The step taken by Government for research and documentation of the medicinal plants which are used by various tribal groups in the country for the treatment of various diseases?

Yes.

- The CSIR-IHBT is documenting the medicinal plants used by the tribal communities of Himachal Pradesh through primary field surveys. It is conducting questionnaire recordings by obtaining Prior Informed Consent.
- Resident communities of Himachal Pradesh such as the Bhangalis, Gaddis, Gujjars, Lahulas and Pangwals have been targeted for the same.
- Additionally, CSIR-IHBT is developing databases on plant resource use such as the TRAMPIS (Traditional Medicinal Plants Information System). This database has information on traditionally used medicinal plants of Himachal Pradesh based on secondary information
- The 'Traditional Knowledge Digital Library', an initiative of CSIR focuses on this aspect. CSIR-IHBT is a party to it.

Some relevant publications

1. Uniyal SK, Singh KN, Jamwal P, BrijLal (2006). Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *Journal of Ethnobiology and Ethnomedicine* 2:14 doi: 10.1186/1746-4269-2-14
2. Uniyal SK, Sharma V, Jamwal P (2011) Folk medicinal practices in Kangra district of Himachal Pradesh, western Himalaya. *Human Ecology*. 39: 479-488. DOI 10.1007/s10745-011-9396-9.
3. Ahmad M, Alpy, Parkash O, Uniyal SK (2017). Folk utilization of plants in Kugti: An interior village of Chamba (Himachal Pradesh). *Journal of Non-Timber Forest Products*: 24(1):7-19.

4. Rana D, Bhatt A, Lal B, Parkash O, Kumar A, Uniyal SK (2020). Use of medicinal plants for treating different ailments by the indigenous people of Churah subdivision of district Chamba, Himachal Pradesh, India. *Environment, Development and Sustainability* <https://doi.org/10.1007/s10668-020-00617-0>.
5. Rana D, Bhatt D, Lal B, Uniyal SK (2021). Taking a leaf from Jantri for traditional medicament- an ancient manuscript in Tankri. *Indian Journal of Traditional Knowledge* 20(2): 451-458.

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. U2129) regarding “Research on algaculture for Bio-Energy”

a) Whether any new technological innovations and initiatives are being taken by Government for the development in the field of algaculture to combat climate change, if so, the details thereof and if not, the reasons therefor;

- In CSIR-IHBT a facility for cultivation of microalgae and germplasm collection centre for fresh water microalgae was established in 2018
- Nine microalgae strains namely, (i) Spirulina platensis, (ii) Chlorella vulgaris, (iii) Chlorella pyrenoidosa, (iv) Chlorella sorokiniana, (v) Scenedesmus obliquus, (vi) Scenedesmus acutus, (vii) Scenedesmus abundans, (viii) Scenedesmus sp., (ix) Monoraphidium sp., are being cultivated for evaluating the nutritional and animal feed applications
- These aforesaid microalgae strains have been cultivated under elevated CO₂ concentrations (range between 0.03% and 3% CO₂ partial pressures) at lab level and reduced carbon sources and waste water obtained from food processing industries to understand bioremediation potential
- Low cost protocols for harvesting and dewatering of microalgae biomass have been standardized at laboratory level
- Research is underway for mass cultivation of these microalgae strains utilizing waste salts generated from beverage industry and their complete chemical characterization for bioenergy and other bio-refinery applications

b) the details of institutions involved in such research work;

CSIR- Institute of Himalayan Bioresource Technology, Palampur (HP)

c) if not, the details of whether Government is considering to formulate any such study; and

Not Applicable

d) whether Government has taken any step to grant incentive for promoting biofuel industries through algaculture, if so, the details thereof and if not, the reasons therefor?

Does not pertain to CSIR-IHBT

26.07.2021

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. S2505) regarding “Research on Ayurvedic Medicines”

- a) **Whether Government has encouraged the research laboratories to develop Ayurvedic medicines for different diseases in the country;**

Yes, CSIR-IHBT Palampur is presently working in close association with Rajiv Gandhi Government Post Graduate Ayurvedic College, Paprola (HP) to validate some molecules to develop Ayurvedic medicine. CSIR-IHBT currently studying important plants like Nirgundi and Hadjod mentioned in Ayurveda to assess and validate their potential in relieving rheumatic complications, improving cartilage health, and respiratory disorders. CSIR-IHBT is also working on anti-malarial aspect and identified lead extract/molecules from traditionally used medicinal plants.

- b) **If so, the details of ongoing projects in different laboratories and progress made so far in each case; and**

The following activities were perceived by the following plants at CSIR-IHBT Palampur:

- Immunomodulation activity on tea based polyherbal formulation is reported at preclinical level and technology transferred to M/s. Vigada Care Pvt. Ltd. Formulation was developed under the regulatory mechanism of FSSAI and product was recently launched under the trade name “IMMUST PRO” (Immunity modulation product) by M/s. Vigada Care Pvt. Ltd. New Delhi.
- Efficacy of medicinal herb *Picrorhiza kurroa* has been tested in Type II diabetes mellitus specifically high fat diet induced preclinical modal of insulin resistance where it has shown remarkable potential to revert the disease phenotype and regulates blood sugar.
- Anti-colitis activity of *Berberis lycium* fruits has demonstrated with good efficacy at preclinical level.
- Our institute is carrying out preclinical efficacy validation and safety of clinically used ayurvedic preparations in collaboration with Ayurvedic college, Paprola, HP. In this context ayurvedic preparations including,

trikatu, triphala, arjuna ksheerpak and phalatrikadi kwath has been validated for their efficacy. Furthermore, safety of Sammerpanag ras has been studied in rats as per standard guidelines. For these activities, the Institute have signed MOU with state Ayurveda department, H.P.

- CSIR-IHBT Palampur already completed some work in this direction by virtue of participation in CSIR Mission on Nutraceuticals and nutritionals. Ongoing CSIR-Immunity mission is targeted towards utilizing herbal formulation for immune modulation and immune boosting.
- Under the project “Exploration of Himalayan Plants for Novel Antimalarial Agents: Characterization of potential molecules (Phase-I&II), one lead extract and two molecules from *Cissampelos pareira* have been identified against Malarial parasite.

c) the steps Indian laboratories are proposing to take to get international recognition of Ayurvedic medicines being developed in India?

CSIR-IHBT is involved in scientific validation of functional foods, nutraceuticals and phytopharmaceuticals in terms of their preclinical validation in *in vitro* and *in vivo* set up. This follows our continuous efforts by complying with national and international regulatory guidelines to get approval for international recognition and marketing.

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. 2634)

- a) **whether Government is working towards linking innovative agricultural technologies with farms to benefit small and marginal farmers in Northeast India and if so, the details thereof;**

CSIR-IHBT has been striving to disseminate technologies developed by the institute to catalyse the economy of North Eastern states. Details of the initiatives undertaken in the North-Eastern states are given below:

1. Introduction of low chilling varieties of Apple in Mizoram

In 2016, a preliminary study was carried out by CSIR-IHBT, Palampur in the north eastern region by planting low chilling apple varieties viz., Anna, Red Fuji, Early Fuji, Sun Fuji, Red Lum Gala, Gale Gala, and pollinizer variety Scarlett Gala in Champhai district of Mizoram in 5.2 acres. The altitude of locations ranged from 1198–1501 m amsl (above mean sea level). After two years of plantation, the crop reported to produce flowers, fruits in good number and the nutritional analysis of the fruit was also at par with the market apple. Apple samples of Mizoram were analysed for quality parameters and were compared with the apple of Himachal Pradesh whose maturity coincide with these low chilling apple varieties. Glucose, fructose, sucrose and total sugar content were higher in apple fruits cultivated in Mizoram as compared to the apples procured from the market of Palampur, Himachal Pradesh. The preliminary examination also indicates this as potential crop for the region and the farmers of the underdeveloped region of the north eastern states can improve their livelihood through adoption of these low chilling apple varieties.

Additionally, during 2019–2020, low chilling apple varieties were also introduced in Ukhrul district of Manipur and West Khasi Hills district of Meghalaya in association with North Eastern Region Community Resource Management Project (NERCORMP) under the project entitled “Capacity building programmes for NERCORMP communities on cultivation and post-harvest management of low chilling varieties of apple.” In this project the capacity building programmes were conducted for the officials of NERCORMP in CSIR-IHBT and in north east states. The plants which were introduced in January-February 2019 in district Ukhrul, Manipur started bearing fruits and the farmers have harvested fruits this year (2021). So far about 16 acres of area have been covered under low chilling apple cultivation in different locations throughout the north eastern states.

In August 2020, North East Council funded a project to CSIR-IHBT to bring 56 acres of area under low chilling varieties in Arunachal Pradesh and Meghalaya under a consultancy project entitled “Promotion of low chilling apple plantation in North Eastern Region of India.” Under this project about 25000 rooted plants of low chilling varieties of apple were supplied by CSIR-IHBT to the north eastern states. Nine low chilling varieties viz., Anna, Dorsett Golden, Red Fuji, Granny Smith, Pink Lady, Gale Gala, Sun Fuji, Early Fuji, Scarlet Gala were supplied to Arunachal Pradesh and Meghalaya.

Apple plants introduced in different locations of Champhai district during January, 2018

Site no.	Village name	Farmer's Name	No of plants
01	Mualkawi	Mr. Zairemthanga	25
02	Mualkawi	Mr. Lianthianga	25
03	Mualkawi	Mr. P.C Liantana	25
04	Mualkawi	Mr. Lalthazauva	25
05	Mualkawi	Mr. E. Lalthneawa	25
06	Mualkawi	Mr C Lalchuanliana	25
07	Mualkawi	Mr Lalpiangmawia	25
08	Mualkawi	Mr. Lalhmangaihtluanga	25
09	Mualkawi	Mr Ramthanga	25
10	Mualkawi	Mr Kaplianhranga	25
11	Mualkawi	Lalrotluanga	25
12	Hnahlan	Mr K. Zoliana	25
13	Hnahlan	Mr Hrangthuami	25
14	Hnahlan	Ms Roseii	25
15	Hnahlan	K. Laltlanzauva	25
16	Hnahlan	Ms K. Lalniliani	25
17	Hnahlan	Dorikhuma	25
18	Talangsam	Mr H. Hmangaiha	30
19	Tlangsam	Mr Vanlalruatkima	30
20	Tlangsam	Mr V L Siama Fanai	30
21	Vengthlang	Mr Valbuanga	30

22	Vengthlang	Mr C Malswma	30
23	Vengthlang	Mr Valbuanga	30
24	Vengthlang	Mr C. Lianzova	20
25	Vengthlang	Mr. K Lalmawia	8
26	New Champhai	Mr Lalrochanga	30
27	Zotlang	Mr Vanlalchhuanga Varte	10
28	Zotlang	Rinthianghlima	25
29	Vengsang	Mr V. Kawlbuaia	25
30	Vengsang	Mr. Lallawmzuala	25
31	Vengsang	Mr Vanlalringheta	30
32	Vengthlang	Mr Vanlawma	20

2. Aromatic plants cultivation and promotion

CSIR-IHBT, Palampur is working on promotion and cultivation of aromatic crops in Northeast India to benefit small and marginal farmers by providing complete agro and process technologies of aromatic crops. Details given in the table below:

Sr. No.	Crop	Region /State	Area covered
1.	Wild marigold	Manipur	32 ha
2.	Damask rose	Dibrugarh, Assam	1 ha
3.	Wild marigold and lemongrass	Mizoram	1 ha
4.	Damask rose	Arunachal Pradesh	2.5 ha
5.	Low chilling apple varieties viz., Anna, Red Fuji, Early Fuji, Sun Fuji, Red Lum Gala, Gale Gala, and pollinizer variety Scarlett Gala	Mizoram	25 ha
6.	Low chilling apple varieties	Ukhrul, Manipur and West Khasi Hills, Meghalaya	
7.	Nine low chilling apple varieties viz., Anna, Dorsett Golden, Red Fuji, Granny	Arunachal Pradesh and Meghalaya	

	Smith, Pink Lady, Gale Gala, Sun Fuji, Early Fuji, Scarlet Gala		
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Distillation units installed in NER

Sr. No.	Beneficiary/Society	Region/ State	Dated
1.	Namponliu Associates	Makhan, Senapati, Manipur	26-04-2018
2.	Manav Jiwan Sudhar Evam Kshamata Nirman Samiti	Daragaon, Soreng, West Sikkim-737 121	27-08-19
3.	Mizoram Rural and Development Society	Zotlang, Aizawl Mizoram- 796 009	06-12-19

3. CSIR- IHBT has done following activities in Sikkim:

- 3.1.** Generated livelihood opportunities for the small and marginal farmers by introducing technology to grow exotic high value mushroom- Shiitake within short duration and space and its processing for value addition.
- Technology feature: Shorter production time: 2 months as oppose to 8-12 months, yield 0.5-0.6 kg/ 1 kg dry substrate, 350 mg powder meets 100% RDA
 - Three SFURTI clusters on Shiitake mushroom production and processing under the SFURTI scheme of Ministry of micro, small and medium enterprises are under implementation at West and South Sikkim with a total budget of Rs 7.35 crore expecting to impact 750 beneficiaries
- 3.2.** Facilitation of organic farming through composts enriched with indigenous microbes with better agricultural attributes and introduction of advanced Anaerobic Digester to process organic waste (250 kg per day).
- Technology feature: Cold tolerant, efficient hydrolytic bacterial consortia with biofertilizers and PGPRs are developed (both aerobic and anaerobic consortia).
 - Anaerobic Digester through DST-WMT scheme has been installed at Gyalshing Municipal Council, West Sikkim to treat 250 kg organic waste per day. Prduscts like Biogas and quality compost will be used for society. MoU signing today

- For generation of livelihood opportunities for marginal farmers one SFURTI cluster on production of enriched compost through MoMSME is getting implemented at West Sikkim with total budget of Rs 2.5 crore impacting 200 beneficiaries.

b) whether Department of Biotechnology has issued special call for Northeast region under the programme which will help in understanding local issues of farmers & provide scientific solutions to them and if so, the details thereof; and

DBT has called for programme like “Development and Utilization of Bioresources of North East Region for Generating Livelihood Security and Entrepreneurship” and CSIR-IHBT in collaboration with counterparts from North East have applied for following projects under the call:

Project number 1: Integrated livelihood generation programme with basic mushroom (Oyster, paddystraw and milky) and advance mushroom (shiitake, Rishi, Wood ear mushroom) clubbed with Vermicompost and Gobar Gas Unit with special emphasis on vitamin D enriched mushroom value added products at Baksa district of Bodoland Territorial Council & Ribhoi District of Meghalaya

Project number 2: Livelihood generation using mass production of bioinoculants and biopesticides targeted towards tea (*Camellia sinensis*) at Kaziranga district of Assam

The projects are submitted but there has been no response from the funding agency so far.

c) whether under the programme hubs in NER will collaborate with scientific institutions of India and Krishi Vigyan Kendras and if so, the details thereof?

Does not pertain to CSIR-IHBT

**Subject: Reply to Parliament Question (Lok Sabha Q. Diary No. 7531)
regarding “Plants on the verge of extinction”**

- a) whether various species of medicinal and aromatic plants are on the verge of extinction in the country;

Yes, various plant species are threatened with extinction. The below mentioned 22 plant species, many of which are medicinal, have been notified as threatened by the Himachal Pradesh State Biodiversity Board.

Sr. No.	Scientific Name	Family
1	<i>Aconitum deinorrhizum</i> Satpf	Ranunculaceae
2	<i>Aconitum heterophyllum</i> Wall	Ranunculaceae
3	<i>Arnebia benthamii</i> (Wall ex G. Don) I. M. Jonst.	Boraginaceae
4	<i>Atropa acuminata</i> Royle ex. Lindle.	Solanaceae
5	<i>Berberis aristata</i> DC.	Berberidaceae
6	<i>Betula alnoides</i> Buch. -Hem. Ex D. Don	Betulaceae
7	<i>Dactylorhiza hatagirea</i> D. Don	Orchidaceae
8	<i>Eremostachys superba</i> Royle ex Benth	Lamiaceae
9	<i>Fritillaria roylei</i> Hook.	Liliaceae
10	<i>Gentiana kurroo</i> Royle	Gentianaceae
11	<i>Habenaria edgeworthii</i> Hook. f. ex Collett	Orchidaceae
12	<i>Jasminum parkeri</i> Dunn	Oleaceae
13	<i>Lilium polyphyllum</i> D. Don	Liliaceae
14	<i>Malaxis muscifera</i> (Lindl.) Kuntze	Orchidaceae
15	<i>Nardostachys grandiflora</i> DC	Boraginaceae
16	<i>Paris polyphylla</i> Sm.	Liliaceae
17	<i>Sinopodophyllum hexandrum</i> (Royle) T.S. Ying	Berberidaceae
18	<i>Skimmia laureola</i> (DC.) Siebold & Zucc. ex Walp.	Rutaceae
19	<i>Staphylea emodi</i> Wall.ex Brandis	Staphyleaceae
20	<i>Swertia chirayita</i> (Roxb. ex Fleming) Karsten	Gentianaceae

21	<i>Taxus contorta</i> Griff.	Taxaceae
22	<i>Trillium govianum</i> Wall. ex D. Don	Melanthiaceae

- CSIR-IHBT, Palampur is working on tissue culture, cell culture and hydroponic and aeroponic farming for conservation of rare, endangered and threatened medicinal and aromatic plants of Himalayas. CSIR-IHBT is successfully developed in vitro protocols and end-to end solution for reintroduction of plants in their natural habitats for conservation purpose. CSIR-IHBT is working on endangered species e.g. *Valeriana jatamansi*, *Podophyllum hexandrum*, *Fritillaria roylei*, *Rhodiola imbricate* etc.

b) whether the medicinal plants being grown with the help of fertilizer that are from different types of chemicals greatly affect their quality under the National Medicinal Plant Board; and

Does not pertain to CSIR-IHBT

c) the effective measures taken by the Government to save human life from its impact

Does not pertain to CSIR-IHBT

Subject: Reply to Parliament Question (Lok Sabha Q. Diary No. 5086)
“Research and Documentation of Medicinal Plants” reg.

- a) **the steps taken by the Government for research and documentation of medicinal plants used by the various tribal groups and villagers for the treatment of various types of diseases in the country along with the details thereof?**

The CSIR-IHBT is working on the documentation of medicinal plants used by the various tribal groups and villagers for the treatment of various diseases. It has documented information on plants used by the *Bhangalis, Gaddis, Gujjars, Lahuals, Pangwals* of Himachal Pradesh for treating various diseases.

Some papers published on the same

Uniyal SK, Singh KN, Jamwal P, BrijLal (2006). Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *Journal of Ethnobiology and Ethnomedicine* 2:14 doi: 10.1186/1746-4269-2-14.

Uniyal SK, Sharma V, Jamwal P (2011) Folk medicinal practices in Kangra district of Himachal Pradesh, western Himalaya. *Human Ecology*. 39: 479-488. DOI 10.1007/s10745-011-9396-9.

Ahmad M, Alpy, Parkash O, Uniyal SK (2017). Folk utilization of plants in Kugti: An interior village of Chamba (Himachal Pradesh). *Journal of Non-Timber Forest Products*: 24(1):7-19.

Rana D, Bhatt A, Lal B, Parkash O, Kumar A, Uniyal SK (2020). Use of medicinal plants for treating different ailments by the indigenous people of Churah subdivision of district Chamba, Himachal Pradesh, India. *Environment, Development and Sustainability* <https://doi.org/10.1007/s10668-020-00617-0>

Rana D, Bhatt D, Lal B, Uniyal SK (2021). Taking a leaf from Jantri for traditional medicament- an ancient manuscript in Tankri. *Indian Journal of Traditional Knowledge* 20(2): 451-458.

07.12.2021

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. U2709)
“National Mission for sustaining the Himalayan Ecosysteme” reg.

a) details of programmes formulated by Government under National Mission for Sustaining the Himalayan Ecosystem (NMSHE) during the last three years;

Task force	Nodal organization/agency
Natural and geological wealth	Wadia Institute of Himalayan Geology
Water, ice, snow resources Including glaciers	National Institute of Hydrology
Forest resources and plant biodiversity	Govind Ballabh Pant National Institute of Himalayan Environment (GBPNIHE)
Micro flora and fauna and wild life & animal population	Wildlife Institute of India
Traditional Knowledge Systems	Jawaharlal Nehru University
Himalayan Agriculture	Indian Council of Agricultural Research

CSIR-IHBT is an active member in the activities of NMSHE. It is a key partner of the task force “Traditional Knowledge Systems” and is involved in “Network programme on convergence of traditional knowledge system for integration to sustainable development of western of Indian Himalayan region”. Here-in the CSIR-IHBT had a focus on the Chamba region of Himachal Pradesh. It has documented the traditional knowledge systems prevalent in the area and also the climate perception of the local communities.

Some of the publications from the NMSHE project

- Rana D, Bhatt D, Lal B, Uniyal SK (2021). Taking a leaf from Jantri for traditional medicament- an ancient manuscript in Tankri. Indian Journal of Traditional Knowledge 20(2): 451-458.
- Rana D, Bhatt A, Lal B, Parkash O, Kumar A, Uniyal SK (2020). Use of medicinal plants for treating different ailments by the indigenous people of Churah subdivision of district Chamba, Himachal Pradesh, India. Environment, Development and Sustainability <https://doi.org/10.1007/s10668-020-00617-0>
- Brij Lal, Dipika Rana and Anupam Bhatt (2019) Natural resource use pattern for self sustenance by the natives of Tissa region of Himachal Pradesh in Western Himalaya, India. In: *Ethnobotany* Vol. 2 (Ed.- Suresh Kumar), Kojo Press, 23 Ansari Road, Daryaganj, New Delhi, pp. 132-152.
- Rana D, A Bhatt and Brij Lal (2020) Studies on lifestyle and livelihood options of the Gujjar Tribe of Tissa Region of District Chamba, Himachal Pradesh in the western Himalaya, In: S. Pant, A. Sharma and V. Sharma

(eds.) – *Ethnobotany and Biodiversity Conservation*, Indus Book Services Pvt. Ltd., 21 Ansari Road, Daryaganj, New Delhi, pp. 1-9.

- Bhatt A, D Rana, SK Uniyal, A Kumar, and Brij Lal (2020) Biodiversity, traditional knowledge and cultural aspects of the native people of Pangi valley, Chamba district, H.P. *Proceedings of International Biodiversity Congress (IBC, Oct., 2018)*, Forest Research Institute, Dehradun, India, Volume IV, pp. 1-6.
- Dipika Rana, Anupam Bhatt and Brij Lal (2019) Ethnobotanical knowledge among the semi-pastoral Gujjar tribe in the high altitude (Adhwari's) of Churah subdivision, district Chamba, Western Himalaya, *Journal of Ethnobiology and Ethnomedicine* 15:10-30, <https://doi.org/10.1186/s13002-019-0286-3>.

b) whether Government has issued any guideline or directives for states of Himalayan region for sustainable development in the view of climate change; and

Not relevant to CSIR-IHBT.

c) if so, the details thereof?

Not applicable.

13.12.2021

Subject: Reply to Parliament Question (Lok Sabha Q. Diary No. 9638)
“Research and Development of Traditional Medicines” reg.

a) **whether Government has entered into any agreement with other countries for research and development of traditional medicines,**

Yes

b) **if so, the details thereof?**

S No.	Title for MoU	Party Name	Date of signing	Duration
1	MoU to collaborate in the areas of mutual interest (medicinal plants, bioactive molecules, herbal formulations etc.)	National Research Institute of Chinese Medicine (NRICM), Taiwan, 155-1, Section 2, Linong Street, 11221 Taipei, Taiwan	21.12.2019	5 Years

c) **whether Government has any scheme to promote traditional and ethnic pharmaceuticals in the country,**

Does not pertain to CSIR-IHBT

d) **if so, the details thereof? And**

Not applicable

e) **the details of the locations where ethnic and conventional medicines are available in the country, State-wise including Tamil Nadu?**

Does not pertain to CSIR-IHBT

Subject: Reply to Parliament Question (Lok Sabha Q. Diary No. 9754)
“Medicinal Herb “Jufa”” reg.

- a) **Whether the Government believes that the medicinal herb “Jufa”, available in high mountainous regions, can be effective in providing protection against respiratory problems;**

As per the literature Jufa, Zuufaa, Zuufaa, Zufah is the common name for *Hyssopus officinalis* L. (family Lamiaceae) is native to Europe and temperate Asia. In India, it is reported from West Himalayas (Kashmir to Kumaon) at altitude of 2800–4200 (Khare 2007, Samant et al. 2007)* which is used in respiratory problems.

- b) **if so, the details thereof?**

The plant is considered as a stimulant, carminative and expectorant and is used in colds, coughs, and congestion and lung complaints (Chopra et al. 1956)*. Leaves are stimulating stomachic, carminative and colic. It is used in coughs, and congestion and lung complaints (Spice Board of India, <http://www.indianspices.com/spice-catalog/hyssop.html>).

- c) **the details of studies, if any, on the broader benefits of medicinal herbs to ensure good lung health for residents of highly polluted cities, conducted in the last three years, year-wise;**

Does not pertain to CSIR-IHBT

- d) **whether the Government is considering to initiate any schemes for promoting the use of such medicinal herbs in the most polluted cities of the country, as a necessary lifestyle change;**

Does not pertain to CSIR-IHBT

- e) **if so, details thereof;**

Not applicable

- f) **whether there are any existing plans or schemes for promoting the use of medicinal herbs for tackling respiratory problems and if so, details thereof?**

Not applicable

*References

Chopkra, R.N., Nayar, S.L., Chopra, I.C. 1956. Glossary of Indian Medicinal Plants. Council of Scientific & Industrial Research, New Delhi.

Khare, C.P. 2007. Indian Medicinal Plants- An Illustrated Dictionary. Springer Science+Business Media, LLC.

Samant, S.S., Pant, S., Singh, M., Lal, M., Singh, A., Sharma, A., Bhandari, S. 2007. Medicinal plants in Himachal Pradesh, north western Himalaya, India. International Journal of Biodiversity Science and Management 3: 234–251

Subject: Reply to Parliament Question (Lok Sabha Q. Diary No. 674) "Make in India initiatives of CSIR-IHBT" reg.

a) whether it is a fact that CSIR and its laboratories are trying their best in Make in India initiatives; and

CSIR-IHBT is making effort for make in India. Below are the areas in which we are trying for make in India:

- a. Hydro and aeroponics: In the area of modern agriculture practises includes hydroponic and aeroponic cultivation. The institute (CSIR-IHBT) has developed cultivation protocol for commercial scale production of high-value flower (Lilium and tulip), spice (oregano, basil and parsley) and commercially important medicinal plants (Picrorhiza kurroa and Valeriana jatamansi). This will create opportunity among farmers, entrepreneurs and youths to sell their product for the income generation and direct benefit to industry and society.
2. Industrial enzymes and useful products: CSIR-IHBT is identifying and characterizing indigenous enzymes for
 - i. Superoxide dismutase from high altitude plants having applications in Medical Industry, Cosmetic Industry, Food Industry, and Plant Industry.
 - ii. Biodegradable-bioplastic Polyhydroxyalkanoates (PHA) and Violacein pigment from the Himalayan bacteria
 - iii. industrial applications such as childhood blood cancer treatment (L-asparaginase),
 - iv. Lignocellulolytic enzymes for the bioconversion of biomass to bioethanol industry (Laccase, cellulases).
 - v. Reverse transcriptase for biotechnological applications, having high temperature stability and having proof reading activity
3. Indigenous multiplex diagnostics for apple and cherry virus and virus-like pathogens having applications in screening of nursery plants and enhancing the quality and quality of rootstocks to be used for apple and cherry
4. Technology has been transferred to private industries and social bodies for production and commercialization. For example, Shiitake mushroom is an import item, through our initiatives we have developed the technology of captive production of shiitake mushroom and have done value addition by enrichment of Vitamin D2. This technology has been transferred to industry stakeholders for commercialization; and through Ministry of MSME this technology has been also getting utilized to generate rural livelihood. The institute has signed a total of 57 ToTs

agreements. Total MoUs and agreements signed by the institute from June 2015 to January 2022 are 488.

5. CSIR-IHBT is giving effort through in vitro propagation techniques to empower Make in India initiatives in mass scale propagation and establishment of new species in India for uplifting farmers income and livelihood

b) if so, the proposal of the Union Government to use and award the research projects of the CSIR laboratories with the State Governments for technology transfer and applications of the products therefor?

- **Heeng cultivation:** Annual imports of *Heeng* is 1540 tonnes with an estimated value of Imports of Rs 942 crore per year. CSIR-IHBT has joined hands with the state government of Himachal Pradesh for asafoetida cultivation for the first time in India to our-self self-sustainable in its production. MoU has already been signed between State Agriculture Department and CSIR-IHBT. Presently we import 1145 tons (worth USD 77m) each year.
- **Introduction of Saffron in Himachal Pradesh:** CSIR-IHBT has joined hands with the state government of Himachal Pradesh for saffron cultivation to make India self-sustainable in its production. MoU has already been signed between State Agriculture Department and CSIR-IHBT. Presently we import 93.5 tons of saffron from Iran each year.
- **Monk fruit cultivation:** CSIR-IHBT for the first time initiated the cultivation of monk fruit through both vegetative methods and *in vitro* methods to make India self-sustainable in natural sweeteners (global market of US\$ 379.4 million by 2026). Field trials are currently going on in the Himachal Pradesh for its cultivation in this region. Presently this crop is grown only in China.
- CSIR-IHBT in collaboration with the Department of Industry, Himachal Pradesh under the Himachal Pradesh Chief Minister startup scheme initiated the training of progressive entrepreneurs to **develop and market products from aloe vera, local fruits, cereals & grains, aromatic and medicinal plants.**
- **Hydro and aeroponics:** Efforts are being made in the area of capacity building through CM-start up scheme, institutional facility can be used as incubation centre and skill development program training to farmers, entrepreneurs and young youths. Already tie-up with the state agriculture Dept. of Chamba for setting-up of commercial hydroponic and aeroponic facility, technical support for cultivation of targeted crops and training to entrepreneurs on hydroponic and aeroponic techniques.
- **Initiated organised cultivation of Dalchini (Cinnamon) in H.P.** India Imports: 45,319 tonnes worth Rs. 909 crores. CSIR-IHBT Introduced Dalchini for the First time in Himachal Pradesh and started its organised cultivation at 10 locations in HP. The institute supplied of quality planting material and undertook capacity building of the farmers. Collaborations of CSIR-IHBT in place with State Agriculture Department, Himachal

Pradesh, ICAR-Indian Institute of Spice Research, Calicut, Kerala & Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (Maharashtra) for technology on its cultivation in North India

- **Introduction of Apples in NE States:** supplied 40,000 apple plants (low chilling varieties and planted in 150 locations. The institute undertook quality evaluation and capacity building of farmers and officials of the NER.
- **Essential Oil Production:** Under CSIR-Aroma Mission technologies for cultivation of aromatic crops led to production of 27.69 tonnes of essential oil and revenue generation of Rs. 17.05 Cr. **Himachal Pradesh is the highest producer of wild marigold essential oil in the country with annual production potential of 6.5 tonnes**, leading to annual revenue generation of Rs. 5 crores to the farmers
- Under **CSIR-Floriculture Mission technologies** for cultivation of floriculture crops led to production of flowers worth Rs.2.68 crores.
- Keeping in view the rising demand of natural sweeteners, the institute has facilitated an annual production of 4000 tonnes of dry leaves of **stevia**, leading to revenue generation of Rs. 40 Cr. through stevia cultivation technology through industrial partnership.
- **Biofertilizers:** activity on development of Biofertilizer was proceeded with setting up Biofertilizer Unit wherein proposal was submitted to Himachal Pradesh Horticulture Development Project and has been considered for funding under Matching Grant Scheme vide No HPHDP/MGS/II/319.
- **Bamboo incense sticks:** CSIR-IHBT with the help of state government of Himachal Pradesh, has developed technology for production of incense sticks from bamboo to make self-sustainable in its production. Presently we import more than Rs 546 crore of raw agarbatti each year.
- Established collaboration with Khadi Village Industry Commission, Gol and, three Non-government organizations for the production of **Vitamin D2 enriched Shiitake mushroom** at three SFURTI clusters in Sikkim with financial support of Ministry of MSME.
- Established collaboration with Foundation of MSME clusters, New Delhi and two Non-government organizations for the production of **vermicompost, vermiwash and enriched compost** in Sikkim and Himachal Pradesh.
- Transferred the technology of Vitamin D2 enriched Shiitake mushroom to six industry stakeholders for the production of the high value medicinal edible mushrooms.
- Transferred the technology of indigenous Biofertilizer to a Biofertilizer industry at Sikkim for the production of indigenous Biofertilizer.

List of technologies developed from the research projects sanctioned by CSIR

1. Technology for commercial production of iron and zinc enriched Spirulina based food products (energy bars)

2. Technology for commercial production of multigrain high protein mixes
3. Technology for commercial production of protein and fiber enriched energy bars
4. Technology for commercial production of micronutrients fortified ready to cook foods
5. Technology for commercial production of herbal formulations for cartilage health (Oral formulations)
6. Technology for processing **herbal formulation for immunity modulation**

No. of technology partners/beneficiaries – 14 nos.

Commercialization of technologies

Technology	Technology partners/Licensee
Technology for commercial production of iron and zinc enriched Spirulina based food products (energy bars)	<ol style="list-style-type: none"> 1. Yujo Agriculture & Aquaculture Farm Society, Meerut, U.P. 2. Daziran Health Products, Coimbatore, Tamil Nadu 3. Lennix Inc., New Delhi
Technology for commercial production of multigrain high protein mixes	<ol style="list-style-type: none"> 1. Unati Co-Operative Marketing cum Processing Society, Talwara, Punjab 2. Lok Seva Trust, Meerut, U.P 3. Lennix Inc., New Delhi
Technology for commercial production of protein and fiber enriched energy bars	<ol style="list-style-type: none"> 1. Lennix Inc., New Delhi 2. SS Vitran Technologies Pvt. Ltd., Haridwar 3. Sirimiri Nutrition Products Pvt Ltd., Bengaluru 4. MAK Biotek, New Delhi 5. Komal Innovations and Wellness Initiatives, Nagrota Bagwan, Kangra 6. Sumati Foods, Baddi, Himachal Pradesh
Technology for commercial production of herbal formulations for cartilage health (Oral formulations)	<ol style="list-style-type: none"> 1. M/s. Carols Formulations, Jalandhar, Punjab
Herbal Formulation for Immunity Modulation	<ol style="list-style-type: none"> 1. M/s. Vigada Care Pvt Ltd, New Delhi

List of outreach programmes and applications of the products thereof

1. POSHAN Abhiyaan – Nutrition supplementation program

Outreach Program – POSHAN Maitree under the auspices of POSHAN Abhiyaan sponsored by Directorate of Women and Child Development, Govt. of Himachal Pradesh, Shimla

Project title - Evaluation of micronutrient fortification and menu diversity on the health indices of anganwadi attending children aged between 3 & 6 years in Panchrukhi Block, Palampur, Distt. Kangra

Project Location – Panchrukhi block, Palampur tehsil, Distt. Kangra

Target beneficiaries

- Severely acute malnourished (SAM)
- Moderately malnourished (MAM)
- Undernourished pregnant and Lactating Women

No. of. Beneficiaries – 100 nos.

Products approved under the POSHAN Abhiyaan program

1. Iron and zinc enriched Spirulina based energy bars
2. Protein and fiber enriched cereal bars
3. Multigrain high protein beverage mix
4. Iron enriched fruit bars

2. Natural disaster relief activities

Distribution of CSIR-IHBT technology food products viz., (i) Iron and zinc enriched Spirulina based energy bars, (ii) Protein and fiber enriched cereal bars and (iii) Multigrain high protein beverage mix to

1. Kerala Floods Disaster Relief, 2018
2. Cyclone Fani, Odisha and West Bengal, 2019
3. Cylone Amphan, West Bengal, 2020

S. No	Disaster served	Product	No. of units – servings	Total quantity
1	Kerala Floods Disaster Relief, 2018	Protein and fiber enriched energy bars	100000 units (1 lakh units)	4 metric tonnes
2	Cyclone Fani, Odisha and West Bengal, 2019	Protein and fiber enriched energy bars	100000 units (1 lakh units)	4 metric tonnes
3	Cylone Amphan, West Bengal, 2020	Protein and fiber enriched energy bars	100000 units (1 lakh units)	4 metric tonnes
		Iron and zinc enriched Spirulina energy bar	100000 units (1 lakh units)	2 metric tonnes
		Multigrain high protein premix	100000 units (1 lakh units)	20 metric tonnes
Total				34 metric tonnes

- Collaborations with State Government (Himachal Pradesh)

S. No	Title	Activities
1	MoU with Director of Industries, HP Shimla for "CM Startup Scheme Himachal Pradesh"	51 start-ups under "CM Startup Scheme"
2	Transfer of Technology (ToT): Commissioner Trilokpur Temple Trust, Sirmaur (H.P.) Directorate of Agriculture, Shimla	Herbal incense cones Agro technologies of Heeng & Saffron
3	MoUs : Department of Ayurveda, Govt. of H.P. The Palampur Rotary Eye Foundation, Maranda, Palampur SCVB Government College, Palampur RPGMC Hospital, Tanda, Kangra CSKHPKV, Palampur HIMCOSTE, Shimla (H.P.) H.P Agro Industries	Collaborative research and academic activities
4	Consultancy agreements with Department of Ayurvedic Pharmacy, Joginder Nagar (H.P.)	Establishment of three drying sheds and storage godowns
5	MoU with D.C. office Chamba, H.P. MoU with D.C. Office Lahaul & Spiti, (H.P.)	Crop diversification; apiculture; food processing etc.

- MoUs/ agreements signed under 'MSME SFURTI Scheme'

S. No	Agreement/MoUs	Activities
1	Technology transfer and consultancy agreements for preparation of enriched compost/ vermicomposting in cold hilly region	MTEC cluster, West Sikkim TEC cluster, Sirmaur, (H.P.)
2	Agreement with FMC for cut flower cluster	Gondla Cut Flower cluster, Lahaul Spiti (H.P.) Shansha Cut Flower ClusterLahaul Spiti (H.P.)

3	Technology transfer and consultancy agreements for cultivation of Shiitake mushroom	NCSMC, South Sikkim cluster WSSMC, West Sikkim cluster SSMC Sumbuk, South Sikkim cluster
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- **Connect with Other States**

Sr.No.	Description	States Connected
1	MoU's for academic, R&D collaboration and Livelihood promotions	<ul style="list-style-type: none"> • NERCRMS, Shillong, Meghalaya • HNB Garhwal University, UK • JSS College of Pharmacy, Tamilnadu • DBSSK, Dapoli, Maharashtra • ICAR-IISR, Kozhikode, Kerala • SKUAST, Chatha, Jammu, J&K • NMPB, New Delhi

01.02.2022

Subject: Reply to Rajya Sabha Provisionally admitted starred/Unstarred Question Diary No. U1169 regarding "Funds for research on new drugs" reg.

- a) **the percentage hike in allocation of funds to Council of Scientific and Industrial Research (CSIR) under the Union Budget 2022;**

Does not pertain to CSIR-IHBT

- b) **whether the budgetary allocation to CSIR is sufficient to fund the research in new drugs for kala-azar, filaria, leprosy and tuberculosis;**

Does not pertain to CSIR-IHBT

- c) **if so, the details thereof and if not, the manner in which Government proposes to fund and support such research; and**

Not applicable

- d) **the achievements made by CSIR in making affordable drugs for the above said diseases?**

CSIR-IHBT is not working on the above mentioned infectious diseases/parasitic activities

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. S-2399, S803)
“Study on herbs and medicinal plants in tribal areas” reg.

a) whether Union Government is planning to conduct any study in tribal areas particularly in Odisha in respect of availability of herbs and medicinal Plants;

- CSIR-IHBT is involved in promoting cultivation of herbs in form of aromatic plants under CSIR-Aroma mission. Planting material of palmarosa, mint and damask rose has been provided to farmers of Odisha through NGO Social Action for People, Rourkela. A multi-purpose distillation unit (worth Rs. 10 Lakhs) for the extraction of essential oil from the aromatic plants has also been provided to empower the farmers to distil their own produce for production of essential oils.
- Similarly, in the area of Bastar in Chhattisgarh, CSIR-IHBT has promoted cultivation of aromatic crops like lemon grass and has setup essential oil distillation unit of 5 quintal capacity.
- Recently a project sanctioned from National Medicinal Plants Board, Ministry of AYUSH, GoI entitled “Production of Quality Planting Materials of Medicinal Plants Including the Rare Endangered Threatened Species for Conservation and Distribution” costing Rs. 75.00 lakhs, which will benefit tribal farmers particular of Himachal Pradesh.

b) if so, the details and the findings thereof, State/UT-wise and if not the reasons therefor;

- In tribal areas particularly in Odisha, quality planting material of damask rose (6300 rooted plants) and mint (1 ton roots/rhizomes) has been supplied to M/s Social Action for People having official address at Sanyasipali, P.O.- Kolabira, P.S.- Kolabira, Dist. Jharsuguda, Odhisa- during March 2 2022.
- Overall, the area under aromatic crops such as wild marigold, chamomile, damask rose, Indian valerian, lavender, rosemary, lemongrass and palmarosa was extended over 1691 ha in which 3121 farmers benefitted leading to production of 27.39 tonnes of essential oil and revenue generation of Rs. 17.05 Cr. So far, under the CSIR Aroma mission 3,97,725 mandays have been generated. To empower the farmers growing aromatic crops, 51 distillation

units for extraction of essential oils were provided to different farmer groups in the farmers' fields by CSIR-IHBT in the states of Himachal Pradesh.

- In western Himalaya, CSIR-IHBT is conducting floristic surveys (primarily in Himachal Pradesh) for collection of plant specimens, identification, inventorization, digitization, and preservation of the specimens in herbarium (PLP).
 - The CSIR-IHBT is involved in surveying and mapping the medicinal plant wealth of state of Himachal Pradesh. It has developed a database on medicinal plants of the Indian Himalayan Region in a network mode. Amongst others, this database has information on the name, uses and distribution of medicinal plants (n=1582). Distribution maps of 736 plant species have been prepared based on secondary information. It was financially supported by the National Medicinal Plants Board (NMPB), Ministry of AYUSH
 - Also a database “him-Padap-Sankalan” has been created on Flora in Himachal Pradesh with due approval from Botanical Survey of India. It has information on 3200 flowering plant species of HP.
- c) the measures taken/proposed to be taken by Government for documentation of these plants and herbs in the country so as to protect them from being patented in other countries; and**
- Cultivation of aromatic plants led to enhancement of farmers' income by two times over traditional crops as per the National Productivity Council report. It also helped in mitigating the human-wildlife conflicts and contributed in rejuvenation of unutilized land area particularly in regions where crops were affected by monkeys, stray cattle or wild animal menace
 - In Orissa state, the farmers have formed a society named as SAP (Social Action for People) after collaborating with the institute for the cultivation and area extension of aromatic crops in tribal region of Odisha. As already mentioned, a processing unit for value addition of aromatic plants have already been installed by the institute under CSIR-Aroma mission.
 - Ex-situ and in-situ conservation of medicinal Plants of HP are being targeted by the Institute. It is involved in CAMP workshops that target threat assessment of medicinal plants. The Traditional Knowledge Digital Library, an initiative of CSIR focuses on the patent aspect. CSIR-IHBT is a party to it.

d) whether the Government is aware of herbs and plants which are in demand internationally, if so, the details thereof?

- Yes, prioritized medicinal plants are listed by the NMPB. Publications on demand and supply of important medicinal plants are supported by NMPB.
- Aromatic crops, viz., wild marigold, chamomile, damask rose, Indian valerian, lavender, rosemary, lemongrass and palmarosa are in great demand in our country.

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. U2166) "Tribal Medicine Research" reg.

a) the details of the works done for tribal medicine research in the past three years state-wise;

- Documentation of the indigenous knowledge of the tribal communities residing in Kangra, Chamba, Lahaul & Spiti, Kinnaur (Himachal Pradesh) on the uses of medicinal plants is being carried out. Recently, emphasis on Sowa Rigpa is being placed.
- CSIR-IHBT is involved in promoting cultivation of medicinal and aromatic plants in the tribal region of Lahaul & Spiti in Himachal Pradesh. The plant species involved include *Artemisia maritima*, *Dracocephalum heterophyllum*, clary sage, *Inula racemosa*, picrorhiza and *Saussurea lappa*.

b) the details of the funds allocated, released and spent for tribal medicine research in the past three years, statewise;

Not applicable

c) whether there has been any delay in the release of the allocated funds;

Not applicable

d) if so, the reasons therefor;

Not applicable

e) the details of proposed/in progress projects for tribal medicine research, state-wise especially in Maharashtra;

Not applicable

f) whether Government is providing any monetary compensation to the tribes for the traditional knowledge acquired through them; and

Not applicable

g) if so, the details thereof and if not, the reasons therefor?

Not applicable

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. U1724)
“Improvement in efficacy of traditional medicines” reg.

a) whether Government has chalked out any plan to improve the efficacy of traditional medicines in tackling lifestyle diseases;

At IHBT, for improvement in efficacy of traditional medicines, nutraceutical formulations have been developed from herbal (traditional) medicines by using FSSAI and WHO approved supplements as base for product formulations. Efforts are also made towards enrichment of active constituents by following appropriate extraction method. In this way, sensory properties of the traditional medicines are maintained and products are prepared in acceptable and consumer friendly formats (water soluble powder, chewable jellies etc.)

b) If so, the details thereof; and

Mentioned above

c) the steps taken by Government to create awareness about Indian Systems of Medicines as well as showcase various scientific researches being undertaken in the sector?

CSIR-IHBT houses a herbal garden that has more than 100 plant species many of which are used in Indian Systems of Medicine. The institute is further enriching the garden and is also developing QR codes for providing species information.

CSIR-IHBT has developed a database on medicinal plants of the Indian Himalayan Region in a network mode. Amongst others, this database has information on the name, uses and distribution of medicinal plants (n=1582). Distribution maps of 736 plant species have been prepared based on secondary information. It was financially supported by the National Medicinal Plants Board (NMPB), Ministry of AYUSH.

A CSIR-TKDL Point of Presence has recently been established in the premises of CSIR-IHBT. It primarily focusses on digitizing information related to Sowa Rigpa (Tibetan System of Medicine).

Subject: Reply to Rajya Sabha Question Dy. No. U2286 on "Use of biotechnology in Agriculture" reg.

- d) the steps being taken by Government to provide biotechnology trained personnel in various sectors including agriculture;**

Biotechnological tools have a great potential for crop improvement in agri- Hort crops. CSIR-IHBT conducting 3-6 months training programs for students of Bachelor and Master degree in the area of biotechnology, tissue culture for mass propagation plants viz., stevia, chrysanthemum, calla lilies and gerbera plants

- e) whether Government is working on any scheme to promote the use of biotechnology in the fields of agriculture; and**

CSIR-IHBT has undertaken following projects on biotechnology which will have applications in the field of agriculture

External Funded Projects

1. Identification of important transcription factors for modulating plant stress tolerance and secondary metabolism
2. Identification of key genes to enhance photosynthesis and to reduce photorespiration with concomitant increase in Nitrogen Use Efficiency (NUE)
3. Next generation genomics for conservation and improvement of an endangered medicinal herb, *Angelica glauca*
4. Elucidating the role of host transcription factor (s) in disease development by cucumber mosaic virus
5. Comparative structure modelling and simulation approach to improve the bio-physicochemical properties of industrial important enzyme Superoxide dismutase obtained from *Potentilla atrosanguinea*
6. Genetic dissection of micronutrient content and composition in foxtail millet grains for identification of novel genes and their characterization
7. Bio-prospecting and product development from *Curcuma longa* (turmeric) in Uttarakhand
8. Evaluation of role of endophytes in mogroside production of *Siraitia grosvenorii*
9. Investigation of novel formulation approaches for improving the bioavailability of dietary phytochemicals

10. Evaluation of key regulatory genes ASYMMETRIC LEAVES1 and REVOLUTA to make a pitcher in *Nepenthes khasiana*.
11. Studies to identify host factors that are manipulated by cucumber mosaic virus for disease development and spread
12. Rapid and onsite diagnostic for viruses and viroid infecting apple
13. Development of remunerative organic waste management systems for colder regions of India with the intervention of psychrophilic aerobic and anaerobic microbial consortia
14. Metagenomic exploration for efficient and stable bacterial L-asparaginase and its nano-conjugation for therapeutic application
15. Development of efficient psychrotrophic bacterial formulation for preparation of enriched compost / vermicompost in cold hilly region and production and testing of enriched compost / vermicompost
16. Assessment of Biofertilizer for PGPR attributes
17. Characterization of efficient Nitrogen fixing (NFB), Phosphorous solubilizing (PSB) and Potash mobilizing (KMB) bacteria from organic farmlands of Sikkim (ToT)
18. Elucidating the thermoresponsive pathway underlying the regulation of flowering in saffron (*Crocus sativus*)
19. Deciphering the mechanism of epidermal cell differentiation leading to prickly formation in *Rosa hybrida*
20. Evaluation of thermostable variants of copper, zinc superoxide dismutase in combating oxidative stress in *Arabidopsis thaliana*
21. Next-generation genomics for genetic improvement and conservation of endangered Himalayan medicinal herb, *Saussurea costus*
22. Promotion and post-harvest value addition of four important herbs for improvement of livelihood security in cold desert areas of Himachal Pradesh
23. Exploring stress sensitivity and nutritional quality of underutilized grain amaranth (*Amaranthus* spp.) under climate change
24. Captive Cultivation, Development of Location Specific Agrotechnology, Downstream Processing and Value Addition of *Mentha piperita*: A Sustainable Option for Livelihood Improvement and Security in the Himalayan Region
25. Role of viral and host factors in circulative transmission of tomato begomoviruses by the whitefly *Bemisia tabaci*

CSIR Funded projects

1. Genetic improvement of high value medicinal plants (NCP)

2. Functional characterization of the host (plant) and vector (whitefly) proteins in systemic immunity and transmission of virus and virus-like pathogens
3. Next generation genomics for genetic improvement of *Stevia rebaudiana* Bert
4. Up-scaled production of disease free corms of saffron (*Crocus sativus*)
5. Biostimulants Network Project titled “Bio-stimulants for stress amelioration, enhanced plant productivity and soil health (FBR)
6. Development of botanical formulation using *Artemisia maritima* extract for the control of aphids in cabbage/cowpea (DBAM)
7. Genome-Editing Network Project entitled “Genome-editing for crop improvement (GE-Crop) (FBR)
8. Characterization of reverse transcriptase (RNA dependent DNA polymerase) activity from greenhouse whitefly *Trialeurodes vaporariorum*
9. Bioprospecting kinetically stable lytic polysaccharide monooxygenase(s) (LPMOs) for accelerated degradation of lignocellulosic biomass
10. Investigating mechanisms underlying transgenerational heat stress adaptation in plants
11. Revealing the Chloroplast Oxi-proteome and Engineering ROS-insensitive Photosynthetic Apparatus
12. What makes ‘asafoetida’ – understanding the specialized terpenoid metabolic pathway?

f) if so, the details of expenditure incurred by Government for development in organic farming?

The outcomes of the following projects have potential towards organic farming

Title of the project	Total Cost (Rs in lakhs)
Triloki Enriched Composting / Vermicomposting Cluster (under KVIC)	13.09
Moonew Tareybhair Enriched Composting / Vermicomposting Cluster (under KVIC)	13.09
Development of efficient psychrotrophic bacterial formulation for preparation of enriched compost / vermicompost in cold hilly region and production and testing of enriched compost / vermicompost	5.00
Development of efficient psychrotrophic bacterial formulation for preparation of enriched compost / vermicompost in cold hilly	5.00

region and production and testing of enriched compost / vermicompost	
Assessment of Biofertilizer for PGPR attributes	0.99
Characterization of efficient Nitrogen fixing (NFB), Phosphorous solubilizing (PSB) and Potash mobilizing (KMB) bacteria from organic farmlands of Sikkim (ToT)	5.00
Functional characterization of the host (plant) and vector (whitefly) proteins in systemic immunity and transmission of virus and virus-like pathogens	217.09
Up-scaled production of disease free corms of saffron (<i>Crocus sativus</i>)	45.27
Development of botanical formulation using <i>Artemisia maritima</i> extract for the control of aphids in cabbage/cowpea (DBAM)	50.00
Total	354.53

17.03.2022

Subject: Reply to Parliament Question (Rajya Sabha Q. Diary No. S5399) "Pearl cultivation in Himachal Pradesh" reg.

a) whether the Institute of Himalayan Bioresource Technology (IHBT) has gained success in the cultivation of freshwater pearls;

CSIR-IHBT, Palampur (HP) has initiated research and development activity on cultivation of freshwater pearls

b) If so, the details thereof and plans it has to transfer the technology to the interested persons for the cultivation of pearls;

After achieving successful results which are expected in a year's time, the institute would work out cost-benefit analysis and accordingly would proceed for transfer of technology with the interested parties

c) whether Government has any proposal to extend financial help to the persons desirous of pearl cultivation at individual or co-operative levels; and

Not applicable to CSIR-IHBT

d) if so, the details thereof and also whether this technology is proposed to be introduced in other States as well depending upon weather conditions?

Mentioned in part (b)

17.03.2022

Subject: Reply to Parliament Question (Rajya Sabha Q. No 168 (Dy. No. 9595))
“Scientific validation and strong documentation of AYUSH Drugs” reg.

a) whether the Government has undertaken steps to initiate more clinical trials to fill up the gap due to lack of evidence based medicines;

Yes (CSIR IHBT Palampur has initiated process for Human intervention studies for in-house herbal formulations)

b) if so, the details thereof;

To fill gap due to lack of evidence based traditional medicines, CSIR-IHBT has developed in-house herbal formulations for different clinical disorders related to skeletal, neurological and cardiovascular systems. Clinical trials (Human intervention studies) of these formulations will be under taken in CSIR Immunity mission.

In addition, CSIR-IHBT, Palampur has undertaken pre-clinical trials for Rajiv Gandhi Government Post Graduate Ayurvedic College, Paprola (District Kangra, H.P.) of some of the Ayurveda drugs viz., Phalatrikadi Kashaya, Sameer Panag Ras and Shila Sindoor, Arjuna Ksheerapaka and Trikatu

c) whether the Government has undertaken steps towards scientific validation and strong documentation of AYUSH drugs; and

CSIR-IHBT, Palampur is presently not working on any drugs developed by Ministry of AYUSH

d) if so, the details thereof?

Not applicable

17.03.2022

Subject: Reply to Parliament Question (Rajya Sabha Q. No 207 Dy. No. S2138)
“Reserach on herbal medicines like Bahera” reg.

a) whether Government proposes to undertake research on various herbal medicines like Bahera which keeps stomach to brain healthy;

Yes.

b) if so, the number of herbal medicines on which new researches have been done so far; and

Following herbal plants are being scientifically validated for different nutraceutical leads at CSIR-IHBT, Palampur:

1. *Punica granatum*
2. *Mucuna pruriens*,
3. *Withania somnifera*
4. *Bacopa monnieri*
5. *Vitex negundo* (Nirgundi)
6. *Cissus quadrangularis* (Hadjod)

c) the details thereof?

The herbal plants showing leads on nutraceutical properties to combat health related disorders have been mentioned in part (b)

Subject: Reply to Parliament Question (Lok Sabha Q. No 3226) "One Health for All" reg.

a) whether the Government has taken initiative to evaluate the concept of one health for all living organisms including the invisible biota in soil that sustain our agricultural systems; and

1. CSIR-IHBT has undertaken evaluation of soil microbiota from both Eastern and Western Himalayas to help sustain the agroecosystem of high altitude regions.
2. The institute has developed indigenous bacterial formulation for rapid degradation stabilization of human waste (night soil) in cold regions like Lahaul in H.P.
3. Institute is working on biostimulant for stress amelioration enhanced plant productivity and soil health

b) If so, the details thereof;

1. From Western Himalaya, soil microbiota of Lahaul valley (Distt Lahaul & Spiti, HP), Nahan (Distt Sirmour, HP), and Palampur (Distt Kangra, HP) have been explored and from Eastern Himalaya soil microbiota of East Rathong glacier (Sikkim) and Sombaria of West Sikkim have been isolated. The efficient hydrolytic and plant growth-promoting bacteria have been used for the preparation of bacterial formulation of efficient degradation of organic waste. The microbial formulation for stabilization of cattle waste with green biomass has been upscaled and two SFURTI clusters have been established for livelihood generation of 400 people. The enriched compost prepared using the indigenous bacterial formulation has been used for sustaining the agroecosystem of the region. Work is under progress for development of crop specific microbial bio fertilizer.
2. Additionally, indigenous bacterial formulation for the stabilization of human waste (night soil) in Lahaul region has been conducted and the prepared compost is being used in the agriculture farmlands. The salient features of the product are: Ready to use formulation, contains cold tolerant hydrolytic bacteria, and effective carrier material: reduced foul odour during composting process. Work is under progress for development of crop specific microbial biofertilizer.
3. We are also working in the CSIR projects on "Biostimulant for stress amelioration enhanced plant productivity and soil health", where we are working to 'identify and characterize the indigenous, culturable, invisible rhizobacteria (biota) from native soil and find out its potential for plant growth promotion'. It is likely that some of these rhizobacteria with efficient plant growth promoting traits could be used as biostimulants/biofertilizer for safe sustainable agriculture.

Subject: Reply to Parliament Question (Lok Sabha Q. Dy. No 12139) "Identification of Medicinal Plants and Rare Species of Herbs" reg.

a) whether the Government has conducted any survey to identify medicinal plants and rare species of herbs in the country and if so, the details thereof along with the list of plants identified, State /UT-wise including Bihar:

Based on the need of the country, CSIR-IHBT, Palampur has undertaken cultivation, characterization and value addition of the following precious medicinal herbs with aim to achieve self-sufficiency:

- Heeng (*Ferula asafoetida*) is one of the top condiment and medicinal plant traded in India. India imports about 1540 tonnes of raw asafoetida annually from Afghanistan, Iran and Uzbekistan worth Rs 942 crores per year (2019). CSIR-IHBT introduced Heeng seeds (six accessions) for the first time in the country from Iran through ICAR-NBPGR, New Delhi, raised nursery plants and started its cultivation 169 locations in different districts of Himachal Pradesh, planting a total of 21,250 heeng plants. Initial trials have also been started in J&K, Ladakh and Uttarakhand with planting of 100 seedlings in each of the location.
- Saffron (*Crocus sativus*) is the most expensive spice of the world. The annual demand for this spice is 100 tons per year but its average production in India is about 6-7 tons and hence a large amount of the spice is imported. With an objective to extend the saffron cultivation beyond Kashmir, CSIR-IHBT developed disease free corms production technology through tissue culture and identifying the suitable locations across the western Himalayas through the MAXENT model having the potential to cultivate saffron. Initial experiments conducted in the non-traditional areas of H.P. and Uttarakhand yielded promising results from some locations of districts Chamba, Kinnaur, Mandi and Kangra in Himachal Pradesh and Bageshwar of Uttarakhand state. Quality of the produce was found to be at par with the quality of Kashmiri saffron.
- India imports 45,319 tonnes of Dalchini (*Cinnamomum verum*) worth Rs. 909 crores. CSIR-IHBT introduced Dalchini for the first time in Himachal Pradesh and started its organized cultivation at 10 locations in the state. The activity is being persuaded in collaboration with State Agriculture Deptt, HP and other organizations.
- In the western Himalaya, CSIR-IHBT is conducting floristic surveys (primarily in Himachal Pradesh) for collection of plant specimens, identification, inventorization, digitization, and preservation of the specimens in herbarium (PLP). CSIR-IHBT has created a database "himFloris" on distribution and status of flowering plant resources in western

Himalaya, depicting the information generated from the field surveys (ground truthing) as well as published literature. It was created under the aegis of National Bioreource Development Board, DBT, New Delhi. It has information on medicinal and rare plants.

- CSIR-IHBT co-ordinated creation of database containing information on about 1582 medicinal plants of the Himalayan region. The database has been developed for National Medicinal Plants Board, Ministry of AYUSH, New Delhi in a network mode with Indian Institute of Integrative Medicine, Jammu; North East Institute of Science and Technology, Jorhat; and North Eastern Hill University, Shillong.
- The institute conducted Rapid Vulnerability Assessment of 15 high value medicinal plants and their habitat characterization.
- Ruthless extraction of medicinal plants has resulted in their sharply declined status in the wild. In this direction, CSIR-IHBT has put efforts on promotion of cultivation of medicinal plants and conversion of their status from rare and threatened to the non-threatened. About 1.4 lacs plants of *Valeriana*, *Inula* and *Podophyllum* have been rehabilitated in natural habitat in forest. These efforts lay basis of linking the activity with the recently approved *Van Samridhi Jan Samridhi Yojana* of the state government.
- In addition to extension cultivation of the sweetener crop Stevia in the country, the institute also introduced another sweetener crop Monk Fruit (*Siraitia grosvenorii*) for the first time in the country, as potential low-calorie natural sweetener, 300 times sweeter than sucrose.
- Institute has been actively engaged for development of quality standards for important phytochemicals from the Himalayan medicinal plants such as *Cissampelos pareira* and *Trillium govanianum*.
- Conservation and sustainable resource generation of high altitude bioresources is being done at CSIR-IHBT Centre for High Altitude Biology, Ribling, Keylong, Lahaul & Spiti district. This centre maintains germplasm of *Trillium govanianum*, *Aconitum heterophyllum*, *Picrorhiza kurrooa*, *Fritillaria roylei*, *Dactylorhiza hatagirea*, *Saussurea costus*, *Inula racemosa* etc. Characterization and consolidation of *Hippophae* genetic resources and propagation of elite genotypes for varietal evaluation is being done there.
- CSIR-IHBT is actively involved in research on population and distribution of medicinal plants, their extraction patterns, indigenous uses, and value chain. The institute is generating chemical and spectral signatures of medicinal plants
- Institute is also generating geo-tagged digital database for herbal plants
- CSIR-IHBT, Palampur is working on tissue culture, cell culture and hydroponic and aeroponic farming for conservation of the herbs.

- b) whether the Government has assessed the various uses of these plants and if so, the details thereof with special reference to those in Bihar,**

The following activities were perceived by the following plants on human at CSIR-IHBT, Palampur (HP):

Subject: Reply to Parliament Question (Lok Sabha Q. No 4860) "Herbal Heritage Trees" reg.

a) whether the Government has any statistics on the number of herbal heritage trees available across the country;

This information as such is not available with the institute.

However, CSIR-IHBT Palampur has following herbal heritage plants in its campus:

1. Aonla: 40-50 plants
2. Pepal: 2 No.

In addition, it pertinent to mention here that *Ginkgo biloba* L. is a valuable plant for mankind since more than 5000 years and is considered as a "living fossil" of Jurassic period. CSIR-IHBT has developed protocol for generation of planting material of this plant and raised 30,000 saplings also planted six-acre area of this species in its research farms, and promoted plantation in Himachal Pradesh. During last 5 years, 3,756 plants were distributed.

b) if so, the details thereof, State/area-wise;

As above

c) the details of top 20 trees with herbal presence, State-wise; and

Currently, CSIR-IHBT, Palampur has conserved 46 tree species in the Botanical Garden of which top 20 trees having valued medicinal/ herbal importance are provided below-

1. *Bombax ceiba* L.
2. *Cedrus deodara* (Roxb. ex D.Don) G.Don
3. *Cinnamomum camphora* (L.) J.Presl
4. *Cordia dichotoma* G.Forst.
5. *Ehretia acuminata* R.Br.
6. *Elaeocarpus sphaericus* (Gaertn.) K.Schum.
7. *Ficus palmata* Forssk.
8. *Ginkgo biloba* L.
9. *Mallotus philippensis* (Lam.) Müll.Arg.
10. *Mangifera indica* L.
11. *Melia azedarach* L.
12. *Phoenix sylvestris* (L.) Roxb.

13. *Phyllanthus emblica* L.
14. *Prunus persica* (L.) Batsch
15. *Putranjiva roxburghii* Wall.
16. *Saraca asoca* (Roxb.) Willd.
17. *Syzygium cumini* (L.) Skeels
18. *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.
19. *Terminalia chebula* Retz.
20. *Vernicia fordii* (Hemsl.) Airy Shaw

It is also mentioned that CSIR-IHBT has created a database (himFloRIS) on distribution and status of 1141 flowering plants of Himachal Pradesh including important tree species of herbal importance based on field surveys and published literature.

d) the details of funds provided and utilized along with the number of herbal saplings planted as on date, for maintaining clean and healthy environment?

Recently NMPB has sanctioned a project entitled “Establishment of Institutional herbal garden at CSIR-IHBT Palampur” vide file no. HG/HP-01//2021-22 NMPB (GAP 0281; Total sanctioned amount Rupees 27 Lakhs for 5 years of which first year grant of Rs. 15 lakhs have been released), under which 125 herbal plants has proposed for conservation along with 37 trees with medicinal importance. The planting beds are under preparation and plants will be planted between May to August, 2022.

28.03.2022

Subject: Reply to Parliament Question (Rajya Sabha Q. Dy. No U4492) "Giloy induced liver toxicity" reg.

a) whether it is a fact that Giloy induced liver toxicity has resulted in liver damage in a few patients:

The Institute is not working on 'Giloy induced Liver toxicity'.

b) if so, the details thereof;

Not applicable

c) whether the specific dose of Giloy intake has been published and communicated to all the stakeholders;

Not applicable

d) if so, the details thereof; and

Not applicable

e) any action taken against those who have falsely linked the medicine to liver damage if Giloy is safe?

Not applicable

29.03.2022

**Subject: Reply to Parliament Question (Lok Sabha Q. No. 437)
“Research on Ayurvedic Medicines” reg.**

- a) **Whether Government has been encouraging research to develop Ayurvedic medicines for different diseases in the country;**

Yes, CSIR-IHBT Palampur is presently working in close association with Rajiv Gandhi Government Post Graduate Ayurvedic College, Paprola (HP) to validate some molecules to develop Ayurvedic medicine. CSIR-IHBT currently studying important plants like Nirgundi and Hadjod mentioned in Ayurveda to assess and validate their potential in relieving rheumatic complications, improving cartilage health, and respiratory disorders. CSIR-IHBT is also working on anti-malarial aspect and identified lead extract/molecules from traditionally used medicinal plants.

- b) **If so, the details of ongoing projects in different laboratories, State/UT-wise including Chhattisgarh along with the progress made so far in each case; and**

The following activities were perceived by the following plants at CSIR-IHBT Palampur:

- Immunomodulation activity on tea based polyherbal formulation is reported at preclinical level and technology transferred to M/s. Vigada Care Pvt. Ltd. Formulation was developed under the regulatory mechanism of FSSAI and product was recently launched under the trade name “IMMUST PRO” (Immunity modulation product) by M/s. Vigada Care Pvt. Ltd. New Delhi.
- Efficacy of medicinal herb *Picrorhiza kurroa* has been tested in Type II diabetes mellitus specifically high fat diet induced preclinical modal of insulin resistance where it has shown remarkable potential to revert the disease phenotype and regulates blood sugar.
- Anti-colitis activity of *Berberis lycium* fruits has demonstrated with good efficacy at preclinical level.
- Our institute is carrying out preclinical efficacy validation and safety of clinically used ayurvedic preparations in collaboration with Ayurvedic

college, Paprola, HP. In this context ayurvedic preparations including, trikatu, triphala, arjuna ksheerpak and phalatrikadi kwath has been validated for their efficacy. Furthermore, safety of Sammerpanag ras has been studied in rats as per standard guidelines. For these activities, the Institute have signed MOU with state Ayurveda department, H.P.

- CSIR-IHBT Palampur already completed some work in this direction by virtue of participation in CSIR Mission on Nutraceuticals and nutritionals. Ongoing CSIR-Immunity mission is targeted towards utilizing herbal formulation for immune modulation and immune boosting.
- Under the project “Exploration of Himalayan Plants for Novel Antimalarial Agents: Characterization of potential molecules (Phase-I&II), one lead extract and two molecules from *Cissampelos pareira* have been identified against Malarial parasite.

c) the steps taken by the Government to get international recognition for Ayurvedic medicines which are being developed in the country?

CSIR-IHBT is involved in scientific validation of functional foods, nutraceuticals and phytopharmaceuticals in terms of their preclinical validation in *in vitro* and *in vivo* set up. This follows our continuous efforts by complying with national and international regulatory guidelines to get approval for international recognition and marketing.

Subject: Reply to Parliament Question (Lok Sabha) Q. Dy. No 18922 "Clinical Trials of Ayurvedic Drugs" reg.

- a) **whether the Government domestically and globally proposes to analyse the medical scheme to be supported by clinical tests and trials to establish domestically and globally the efficacy of 57 ayurvedic dravyas and 600 Indian medicinal plants referred in official grantha for side effect free treatments;**

Does not pertain to CSIR-IHBT

- b) **if not, the reasons therefor; and**

Not applicable

- c) **whether some of these remedies have been prescribed according to the said Granthe texts and scientific studies and proved to be very effective like Arjuna bark powder and Arogyavardhini for bad cholesterol and Chyawanprash for cough and cold?**

Not applicable