

National Mission on Himalayan Studies (NMHS)

HIMALAYAN RESEARCH FELLOWSHIP

[Reporting Period: 1st January, 2018 to 31st July, 2018]

Name of the Institution/ University:	Himachal Pradesh University, Shimla
No. of Himalayan Research/Project Associates:	02 (Two)
No. of Himalayan Junior Research/Project Fellows:	05 (Five)

Himalayan Research Associates (H-RAs)

H-RAs Profile Description:

S. No.	Name of RA	Date of Joining	Name of the PI and Designation	Qualification
1.	Dr. Rajesh Kumar Shandil (RKS)	01-09-2016	Dr. Arvind Kumar Bhatt Professor	M.Sc., Ph.D.
2.	Dr. Shikha Devi	15-09-2016	Dr. Arvind Kumar Bhatt Professor	M.Sc., Ph.D.

Progress Report (to be filled for each H-RA in separate row):

RA No.	Research Objective(s)	Addressed Deliverables	Achievements	Location of Field Site with Details, if any
1.	To explore the traditionally important medicinal plants being used by herbal practitioners to cure several diseases. Exploring anti-microbial potential of few important medicinal and aromatic plants of Himachal Pradesh and green synthesis of silver nanoparticles of the plant extracts.	<ul style="list-style-type: none"> • Formulation of strategy, herbal alternate to tackle pathogens. • Selection and collection of plant materials, drying and making stock solution with different solvents. • Determination of antimicrobial activity and MIC of selected medicinal plants. 	<ul style="list-style-type: none"> • Experiments of plant extracts preparation were conducted using different solvents. • The stock solution of different plant extracts were prepared using DMSO. • <i>Rhododendron campanulatum</i>, <i>Bryophyllum pinnatum</i>, <i>Allium ursinum</i>, <i>Mentha arvensis</i> and <i>Roylea cinerea</i> were selected for evaluation of antibacterial activity against pathogenic bacterial strains using agar well diffusion method. • MIC of methanolic extract <i>Rhododendron campanulatum</i> (leaves) was carried out. • Progress presented before Experts in HRC • Suggestions of the experts implemented in future work. 	<p>Different areas of Shimla district such as Rohru, Chirgaon, Theog, Narkanda, Kumharsain, Rampur, Kotgarh, Gopalpur, Jhakhari, Jeuri, Sarahan, Dobi and Manjhgaon, Dodra, Kavar, Pujarli, Jakha, Bhauta, Jiskoon, Patta Dobu, Kiterwari, Dhanderwari, Dhara and Katol, Dochi, Sansog, Chamaru, Kanot, Chhajpur, Tangnoo, Mundhol, Gumma, Khadapathar, Kotgaon, Jubbal etc. were covered to collect information regarding use of medicinal plants from herbal practitioners through several visits, questionnaires, open interviews and group discussions.</p> <p>Study area lies between longitude 77.00" and 78.19" east and latitude 30.45" and 31.44" north.</p>
2	Microbial	<ul style="list-style-type: none"> • Isolation of 	<ul style="list-style-type: none"> • Best isolate L2 was optimized 	Study area: Lahaul Spiti &

	<p>utilization of industrial and other wastes for production of commercially viable and useful by-products.</p> <p>Production of commercially important products like bio-fuels, nutraceuticals, etc.</p> <p>Efforts to develop an integrated process of waste utilization.</p>	<p>useful microbes for the utilization of the waste.</p> <ul style="list-style-type: none"> • Model prototype for utilization of waste at lab scale. • Scale up of waste utilization and production process 	<p>for lignin peroxidase (LiP) production and isolate S7 for xylanase production.</p> <ul style="list-style-type: none"> • Various types of waste individually and in different combinations were evaluated as substrates for xylanase production. • Eco-friendly process was developed for cost effective production of xylanase enzyme using waste as carbon source. • Crude xylanase was utilized for saccharification of different waste (i.e. fruit industrial waste, agro industrial waste and agroresidues). • After xylanase treatment, sugar released from the biomass was estimated by dinitrosalicylic acid (DNS) method. • For the fermentation process, a total of nine C-5 fermenting microbes were isolated and amongst all, three isolates were found positive for xylose fermentation. • Progress presented before Experts in HRC • Suggestions of the experts implemented in future work. 	<p>Shimla.</p> <p>Survey of the study area was done to collect the water, dung and soil samples.</p> <p>Samples were collected from different areas of Lahaul Spiti (Keylong, Biling, Jispa, Darcha and Gramphu lake, Kibber, Kaza, Kungri-Guling, Pin Valley, Tabo), Kullu (Rohtang, Manikaran and Parvati river) and Shimla (Sarahan, Kumarsain, Thanedar, Hatupeak, Hatu, Kotgarh, Challa, Summerhill and Junga) districts of Himachal Pradesh, India.</p>
--	---	---	--	---

* Note: Data, table and figures may be attached as separate source file (.docx, .xls, .jpg, .jpeg, .png, .shp, etc.).

Himalayan Junior Research/ Project Fellows (H-JRFs)

H-JRFs Profile Description:

S. No.	Name of JRF	Date of Joining	Name of the PI	Qualification
1.	Mr. Rajeshwer	19-08-2016	Prof. Arvind Kumar Bhatt	M.Sc., M.Phil.
2.	Mr. Vishal Ahuja	19-08-2016	Prof. Arvind Kumar Bhatt	M.Sc. and NET
3.	Ms. Kalpana Thakur	19-08-2016	Prof. Arvind Kumar Bhatt	M.Sc., M. Phil.
4.	Ms. Mamta Devi	19-08-2016	Prof. Arvind Kumar Bhatt	M.Sc., M. Phil.
5.	Ms. Vaishali Sharma	19-08-2016	Prof. Arvind Kumar Bhatt	M.Sc., M. Phil.

Progress Brief (to be filled for each JRF in separate row):

JRF No.	Research Objectives	Deliverable	Achievements	Location of Demonstration/ Study Site with Details *
1.	<p>Promotion of traditional/ Indigenous herbal based healthcare practices with emphasis on medicinal and aromatic plants and other non-agriculture resources to improve rural economy in Himachal Pradesh.</p> <p>Antimicrobial potential and the MIC of phytochemicals from selected plants against the certified pathogenic strains.</p>	<ul style="list-style-type: none"> • Systematic participatory documentation of local health traditions (LHT) • Preparation of Inventory of medicinal plants duly protected from misuse • Determination of Antimicrobial activity and MIC of selected medicinal plants 	<ul style="list-style-type: none"> • Interacted with about 200 local practitioners (10 Districts) and gain knowledge about various properties of medicinal plants and their uses. • Collected near about 25 medicinal plants and out of them 5 carried out for further antimicrobial activity assay and MIC determination. • Progress presented before Experts in HRC • Suggestions of the experts implemented in future work. 	<p>Survey was carried out in different area of state and interacted to about 216 vaidyas of different districts viz. Shimla (26), Kinnaur (17), Lahaul-Spiti (26) Kangra (50), Bilaspur (8) Una (21), Solan (25) Sirmaur (35) and Hamirpur (8).</p> <p>Different villages visited i.e. Rajgarh, Giripul, Yashwant Nagar, DarjaNauni, Habban, Behar, Rug Bhagota, Rohru, Dodra Kavar, Jubbal, Khada pathar, Hatkoti, Chirgaon, Shimla local, Dodra and Kavar, Tapri, Sangla Valley, Chhitkul, ReckongPeo, Kalpa, Ribba, Gemur, Sumdo, Giyu, Tabo, Pin Valley, Kaza, Kibber, Bangana, Amb, Amboa, Babehr Daulatpur, Ambota, Khad, Haroli, MehatPur, Una, Samnal, Behdara, Bathu, Haroli, Jawali, Dehra, Pragpur, Ghallour (Dehra gopipur), Garli (Rakkar) Bani (Rakkar), Nehran Pukhar, Masroor (Nagrota Surian), Bankhandi Haripur, Chanauta, Hadiyal, Kehriyan Jaunta, Hara Jawali, Jassur Matlahad Jwali, Dramman Shahpur, Phariyan, Ranital Nurpur, Nagrota Bagwan, Shallaghat, Kumarhatti, Dochi and masol etc.</p>
2.	<p>Rapid assessment of selected healthcare practices, prioritized by local communities, based on secondary information supplemented with primary data</p> <p>Design and implementation of participatory clinical trials for high priority local health practices (LHPs) in local community</p>	<ul style="list-style-type: none"> • Documentation of traditional herbal remedies, local vaidyas, medicinal formulations and their scientific relevance in modern day healthcare. • Rapid assessment of selected health practices, prioritized by local communities, identification of constrains and opportunities and linking and 	<ul style="list-style-type: none"> • 16 plant samples from different plants were collected from different locations of Shimla district • Out of those, 4 plant samples were analyzed for their antimicrobial potential against human pathogens • All four plant samples were effective against pathogens • Progress presented before Experts in HRC • Suggestions of the experts implemented in future work. 	<p>Shimla district</p> <p>77.00" - 78.19" longitude</p> <p>30.45"-31.44" latitude</p> <p>7 sub divisions, 5 town, 12 tehsil</p>

		integrating small collectors and growers to domestic and international markets.		
3.	<p>Promotion via a participatory process, of sound LHPs, in the community, in order to enhance health security of rural communities.</p> <p>To explore the traditionally important medicinal plants being used by herbal practitioners to cure several diseases.</p> <p>Phytochemical analysis, purification of bioactive components from extract.</p>	<ul style="list-style-type: none"> • A participatory process, of sound LHPs, in the community and to examine success stories in the production and marketing of herbs, medicinal and aromatic plants. • Performing phytochemical screening and purification of bioactive compounds present in plant extracts. • Compilation and analysis of data, finalization of results and reports. 	<ul style="list-style-type: none"> • Collection of plant material. • Antimicrobial potential of <i>E. globules</i> (leaves), <i>R. cinerea</i> (leaves), <i>B. aristata</i> (stem), <i>B. macrophylla</i> (leaves), <i>B. ceiba</i> (bark) and <i>Psidium guajava</i> was checked. • MIC of methanolic extract <i>E. globules</i> (leaves) and acetone extract of <i>B. ceiba</i> (bark) was carried out. • Progress presented before Experts in HRC • Suggestions of the experts implemented in future work. 	<p>Study area: Kangra of Himachal Pradesh is located in the foot hills of Dhauladhar range. Local hakims, healers and villagers of Kangra have been using numerous plants for their basic health care needs.</p> <p>Flora of Kangra is very unique and it consists of diverse forests due prevailing climatic conditions. Various areas of district kangra Khera, Palampur, Yol, Utsehar, Kunsal, Bir-Billing, Manghol, Banuri, Panchrukhi, Dharaman, Dari, Paprola, Gopalpur, Dharamshala, Kandbari, Jawalaji, Dari, Baijnath, Ramerh, Thakurdwara, Mcleod Ganj, Kangra, Chamunda, Mahakal, Gang Bharuv, Badol, Jawali, Rainta (Dehra gopipur), Pragpur, Ghallour (Dehra gopipur), Garli (Rakkar) Bani (Rakkar), Nehran Pukhar, Masroor (Nagrota Surian), Bankhandi Haripur, Chanauta, Hadiyal, Kehriyan Jaunta, Hara Jawali, Jassur Matlahad, Jwali, Dramman Shahpur, Phariyan, Ranital Nurpur, Nagrota Bagwan have been covered during the field surveys.</p>
4.	<p>Explore anti-microbial potential of few important medicinal and aromatic plants of Himachal Pradesh and green synthesis of silver nanoparticles of plant extracts.</p> <p>Phytochemical analysis, purification of bioactive components from extract. Green synthesis of nanoparticles (Ag and Fe) and their characterization using UV- visible</p>	<ul style="list-style-type: none"> • Formulation of strategy. • Herbal alternate to tackle pathogens, selection and collection of plant material, drying, making stock solution with different solvents. • Performing phytochemical screening and purification of bioactive compounds present in plant 	<ul style="list-style-type: none"> • Collection of plant material i.e. (<i>O. corniculata</i>, <i>T. arjuna</i>, <i>L. camara</i>, <i>T. bellirica</i> <i>A. marmelos</i>, <i>Woodfordia fruticosa</i>). Antimicrobial potential was checked by agar well diffusion method. • Minimum inhibitory concentration was determined by Resazurin dye method. MIC of Methanolic extract of <i>T. arjuna</i> and <i>L. camara</i> was also carried out. • Progress presented before Experts in HRC • Suggestions of the 	<p>Study area: Solan is located 46 kilometres south of the state capital, Shimla Himachal Pradesh. Different sites and localities of Solan district were visited during the survey regarding the use of medicinal and aromatic plants of Solan district i.e. (Nand, Janon, Ghniri, Gujjarhati, Chamba, Handoor, Arki, Kunihar, Chail, Vaknaghat Mamleeg, Chhejha, Dumer, Koyala, Kishanpura, Narag, Daron, Devriya, Dharot, Diggall, Bagvania, Masol, Dochi, Sola meel, Kumarhatti, Nalagarh etc.).</p>

	spectroscopy, X-ray diffraction, Atomic force microscopy, FTIR analysis, SEM/TEM, etc.	extracts Green synthesis of nanoparticles, their characterization.	experts implemented in future work.	
5.	Microbial utilization of industrial and other wastes for the production of commercially viable and useful by products like bio-fuels, nutraceuticals etc. Efforts to develop an integrated process of waste utilization.	<ul style="list-style-type: none"> • Isolation of useful microbes for the utilization of the waste. • Model prototype for utilization of waste at lab scale. • Scale up of waste utilization and production process. 	<ul style="list-style-type: none"> • The best isolate <i>Bacillus subtilis</i> was optimized for cellulase production and reaction parameters. • Pretreatment of various wastes through physical, chemical and enzymatic treatments. • Cellulase from <i>Bacillus subtilis</i> was further utilized for the saccharification of various wastes like sugarcane baggase, Rice straw, wheat straw, Corn straw, Pine needles. • Amount of fermentable sugars were estimated. • Total 24 ethanol fermenting isolates were isolated from the raw samples procured from local breweries and among them 13 isolates were positive for ethanol fermentation. • Progress presented before Experts in HRC • Suggestions of the experts implemented in future work. 	For the isolation of lignocellulolytic microorganisms soil, water, cow dung samples were collected from different areas of Kullu (i.e. Rohtang, Manikaran and Parvati river), Lahaul-Spiti (i.e. Keylong, Biling, Jispa, Darcha and Gramphu lake) and Kinnaur (i.e. Tapri, Sangla, Chitkul, ReckongPeo, Rarang, Nako, Pooh).

Note: Data, table and figures may be attached as separate source file (.docx, .xls, .jpg, .jpeg, .png, .shp, etc.).

(Signature of Registrar/ Head of Department)

Report (hard copy) should be submitted to:

The Nodal Officer, NMHS-PMU

National Mission on Himalayan Studies (NMHS)

गोविंद बल्लभ पंत राष्ट्रीय हिमालयी पर्यावरण एवं सतत विकास संस्थान

G.B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD)

Kosi-Katarmal, Almora 263643, Uttarakhand

Report (soft copy) should be submitted to: E-mail: nmhspmu2016@gmail.com