

JAI NARAIN VYAS UNIVERSITY JODHPUR



2016 - 2021

3.7.1 Number of Collaborative activities for research, Faculty exchange, Student exchange/internship per year

**LEGUMES
Admin Order**

No. BT/PR28594/NER/95/1496/2018
GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY
(NER-BPMC)

Block 2, 6-8th Floors
CGO Complex, Lodhi Road,
New Delhi- 110 003
Dated:09 /03 /2022

ORDER

Sanction of the President is hereby accorded, under Rule 18 of the Delegation of Financial Powers Rules ,1978 , for the implementation of the project entitled: **"Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers"** for a period of 3 Year 0 Month at a total cost of Rs. **31522320/-** (Rupees Three Crores Fifteen Lakhs Twenty Two Thousand Three Hundred and Twenty Only) on the terms and conditions detailed here under:-

2 The Project :

2.1 Title : "Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers"

2.2 Details of the Investigators:

Project Coordinator

Prof. Saroj K Barik

Director

CSIR-National Botanical Research Institute

CSIR-NBRI, Rana Pratap Marg, Lucknow - 226001, Lucknow,
Uttar Pradesh, 226001

Principal Investigators:

Prof. Saroj K Barik

Director

CSIR-NBRI

CSIR-National Botanical Research Institute

National Botanical Research Institute, Lucknow - 226001

Dr. Nisha Tak

Assistant Professor

Department of Botany, Faculty of Science,

Jai Narain Vyas University

New Campus, Pali Road, Jodhpur 342001, Rajasthan

Dr. Padmaraj Gajurel

Associate Professor

Department of Forestry,

North Eastern Regional Institute of Science And Technology

(Demeed University), Nirjuli-791109, Arunachal Pradesh

Vaishali

डॉ. वैशाली पंजाबी / Dr. VAISHALI PANJABI

वैज्ञानिक 'ई' / Scientist 'E'

बायोटेक्नोलॉजी विभाग / Deptt. of Biotechnology

विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.

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Professor
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Assam (Central) University,
Silchar- 788011, Assam

Prof. Santa R Joshi

Professor
Department of Biotechnology & Bioinformatics
North-Eastern Hill University,
Shillong - 793022, Meghalaya

CO-PI:

Dr. Sorokhaibam Sureshkumar Singh

Associate Professor
Department of Forestry, North Eastern Regional Institute of Science &
Technology (NERIST), (Demeed University), Nirjuli-791109, Arunachal
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Dr. Debjyoti Bhattacharyya

Assistant Professor
Department of Life Science & Bioinformatics,
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Dr. Sanjeev Kumar

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Dr. Sunil S Thorat

Scientist-D
Bioresources Database Unit,
Institute of Bioresources and Sustainable Development
IBSD, Imphal-795001, Manipur

Prof. Hukam S Gehlot

Professor
Department of Botany
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New Campus, Pali Road, Jodhpur - 342001, Rajasthan

Dr. Shweta Jha

Assistant Professor

Department of Botany, Faculty of Science, Jai Narain Vyas University

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Dr. Satya Narayan Jena

Principal Scientist,

Plant Molecular Genetics

CSIR-National Botanical Research Institute, Rana Pratap Marg,

Lucknow - 226001, Uttar Pradesh

Dr. Poonam C Singh

Senior Scientist

CSIR-National Botanical Research Institute

National Botanical Research Institute,

Lucknow - 226001, Uttar Pradesh

Dr. Prabodh Kumar Trivedi

Senior Principal Scientist

CSIR-National Botanical Research Institute

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Lucknow - 226001, Uttar Pradesh

Dr. Puneet Singh Chauhan

Senior Scientist

Microbial Technologies

CSIR National Botanical Research Institute, Rana Pratap Marg,

Lucknow - 226001, Uttar Pradesh

2.3 Objectives:

Overall Objectives:

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains, and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains and development of plant growth promoting (PGP) formulations for both legume crops and non-legume crops including rice and maize.
3. To understand the mechanisms of specificity of broad-range symbiont system by unraveling signal transduction through NGS, metabolomics, transcriptomics, and small RNAs/peptides approaches.

Institute wise Objectives:

Assam (Central) University, Silchar

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains in the selected sites of Cachar district of Assam; and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.

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2. Screening of efficient N fixing promiscuous Assam -RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes.
3. Screening of native Assam-RNB strains for their plant growth promoting (PGP) activities with additional non-legume crops including rice and maize. Antagonistic studies to ensure that new bioformulations developed are not affected by existing formulations used in NER and vice versa.
4. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

CSIR-National Botanical Research Institute

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains, and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. To study cross infectivity of strains isolated from wild/underutilized legumes on legume crops for improved productivity
3. Screening of native NER-RNB for development of plant growth promoting (PGP) formulations and associated antagonistic studies.
4. To understand the mechanisms of specificity of broad-range symbiont system by unraveling signal transduction through NGS, metabolomics, transcriptomics, and small RNAs/peptides approaches.

Jai Narain Vyas University

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains, and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes in glass house.
3. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

Institute of Bioresources and Sustainable Dvelopment

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains in the selected sites of Manipur; and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes.
3. Screening of native NER-RNB strains for their plant growth promoting (PGP) activities with additional non-legume crops including rice and maize. Antagonistic studies to ensure that new bioformulations developed are not affected by existing formulations used in NER and vice versa.

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4. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

North Eastern Regional Institute of Science And Technology

1. Exploration of native/underutilized legumes in various sites of Arunachal Pradesh and isolation, purification and phenotypic characterization of NER-root nodule bacteria (RNB) strains from selected legumes.

North-Eastern Hill University, Shillong

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains in the selected sites of Meghalaya; and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes.
3. Screening of native NER-RNB strains for their plant growth promoting (PGP) activities with additional non-legume crops including rice and maize. Antagonistic studies to ensure that new bioformulations developed are not affected by existing formulations used in NER and vice versa.
4. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

Tripura University

1. Exploration of native/underutilized legumes in various sites of Tripura and isolation, purification and phenotypic characterization of NER-root nodule bacteria (RNB) strains from selected legumes.

2.4 Time Schedule:

The duration of the project is 3 Year 0 Month from the date of this sanction order.

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विज्ञान और प्रौद्योगिकी विभाग / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

2.5 Project Cost:

The total cost of the project is Rs. **31522320/-** (Rupees Three Crores Fifteen Lakhs Twenty Two Thousand Three Hundred and Twenty Only) as per details given below :

Institute	Year I	Year II	Year III	Total Cost(Rs.)
1. Assam (Central) University, Silchar	2128520	1628520	1732200	5489240
2. CSIR-National Botanical Research Institute	1396000	1396000	1479520	4271520
3. Institute of Bioresources and Sustainable Development	1503520	1503520	1607200	4614240
4. Jai Narain Vyas University	1563040	1563040	1674400	4800480
5. North Eastern Regional Institute of Science And Technology	1203520	1203520	1307200	3714240
6. North-Eastern Hill University, Shillong	2288040	1788040	1899400	5975480
7. Tripura University	1001760	801760	853600	2657120
Total (Rs.)	11084400	9884400	10553520	31522320

Institute wise details are:

Budget Head	Year I	Year II	Year III	Total(Rs.)
1. North-Eastern Hill University, Shillong				
Equipment	500000.00			500000.00
Manpower	863040.00	863040.00	974400.00	2700480.00
Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	475000.00	475000.00	475000.00	1425000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Hiring/analytical charges	150000.00	150000.00	150000.00	450000.00
Training/Workshop	100000.00	100000.00	100000.00	300000.00
Total (Rs.)	2288040.00	1788040.00	1899400.00	5975480.00
2. Assam (Central) University, Silchar				
Equipment	500000.00			500000.00
Manpower	803520.00	803520.00	907200.00	2514240.00

Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	475000.00	475000.00	475000.00	1425000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Hiring/analytical charges	150000.00	150000.00	150000.00	450000.00
Total (Rs.)	2128520.00	1628520.00	1732200.00	5489240.00
3. Jai Narain Vyas University				
Manpower	863040.00	863040.00	974400.00	2700480.00
Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	400000.00	400000.00	400000.00	1200000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Hiring analytical Service	100000.00	100000.00	100000.00	300000.00
Total (Rs.)	1563040.00	1563040.00	1674400.00	4800480.00
4. Institute of Bioresources and Sustainable Dvelopment				
Manpower	803520.00	803520.00	907200.00	2514240.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	400000.00	400000.00	400000.00	1200000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Sequencing of Cultures	150000.00	150000.00	150000.00	450000.00
Total (Rs.)	1503520.00	1503520.00	1607200.00	4614240.00
5. CSIR-National Botanical Research Institute				
Manpower	696000.00	696000.00	779520.00	2171520.00
Overhead	100000.00	100000.00	100000.00	300000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	400000.00	400000.00	400000.00	1200000.00
Contingency	100000.00	100000.00	100000.00	300000.00
Total (Rs.)	1396000.00	1396000.00	1479520.00	4271520.00
6. North Eastern Regional Institute of Science And Technology				
Manpower	803520.00	803520.00	907200.00	2514240.00
Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	200000.00	200000.00	200000.00	600000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1203520.00	1203520.00	1307200.00	3714240.00
7. Tripura University				
Equipment	200000.00			200000.00
Manpower	401760.00	401760.00	453600.00	1257120.00

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Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	200000.00	200000.00	200000.00	600000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1001760.00	801760.00	853600.00	2657120.00

2.6 Equipment:

The details of the equipment sanctioned for the implementation of the project at **Annexure-I**

2.7 Manpower:

The details of the manpower sanctioned for the implementation of the project at **Annexure-II**

3. Head of Account:

The **Non-Recurring** expenditure involved is debitable to:

Demand No. 89	Department of Biotechnology
3425	Other Scientific Research 2021-2022
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance to Research and Development
3425.60.200.29.17.35	Grants for creation of capital assets

The **Recurring** expenditure involved is debitable to:

Demand No. 89	Department of Biotechnology
3425	Other Scientific Research 2021-2022
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance to Research and Development
3425.60.200.29.17.31	Grants -in-Aid General

4. Terms & Conditions:

- The Non-Recurring items must be procured and installed within 18-months of the sanction of the project, failing which the PIs have to return the remaining/unutilized Non Recurring grant with 10% of Interest.
- In case the amount of grant-in-aid is refunded, the whole or a part amount of the grant, with an interest at 10% per annum there on shall be recovered.

4.1 The other terms and conditions governing this sanction are attached at Annexure-III.

Vaishali

- 4.2A** Memorandum of Agreement (MoA) will be signed between the Department of Biotechnology and the grantee institution on Non-Judicial stamp paper Rs. 100/- in the enclosed format and the second release/installment will be made only after signing of MoA between the grantee institutions and DBT. In case of NGO's and Private Institution's, execution of MOA is mandatory before first release. A format of the MoA is enclosed in Annexure-IV
- 4.3** The Institute/Agency will keep the whole of the grant in a Bank Account earning interest, and the interest so earned should be reported to DBT in the Utilisation Certificate and Statement of Expenditure. The interest earned should be remitted to the Consolidated fund of India through Bharat Kosh portal(www.bharatkosh.gov.in) as per GFR-2017-230(8) after finalization of the account for a given Financial Year.
- 5.** No International Travel will be undertaken from the sanctioned project grant unless specified otherwise.
- 6.** The Director , North Eastern Regional Institute of Science And Technology, Itanagar, Arunachal Pradesh and The DIRECTOR, CSIR-National Botanical Research Institute, Lucknow, Uttar Pradesh and The Director, Institute of Bioresources and Sustainable Dvelopment, Imphal, Manipur and The Registrar, Assam (Central) University, Silchar, Silchar, Assam and The Registrar, Jai Narain Vyas University, Jodhpur, Rajasthan and The Registrar, North-Eastern Hill University, Shillong, Shillong, Meghalaya and The Registrar, Tripura University, Agartala, Tripura would be responsible for submission of Statements of Expenditure (SoE), utilization certificates (UC), Assets Certificates, Manpower staffing & expenditure details in prescribed DBT formats to DBT in respect of grants released in this project from time to time.
- 7.** PI's of DBT sponsored projects can consider appointment of JRF from Category-II merit list of DBT-BET exam so that candidates can be paid fellowships at par with NET/GATE/BET qualified candidates as per DST OM No. A.SR/S9/Z-05/2019 dated on 30 Jan 2019. However, there is no compulsion on PI's to select candidates for JRF in their projects from Category-II of DBT-BET.
- 8.** As per Rule 236 (1) of GFR 2017, the accounts of all Grantee Institutions or Organisations shall be open to inspection by the sanctioning authority and audit, both by the Comptroller and Auditor General of India under the provision of CAG(DPC) Act 1971 and internal audit by the Principal Accounts Office of the Ministry or Department, whenever the Institution or Organisation is called upon to do so.
- 9.** If the Research Project involves biological resources, the obligations under the Biological Diversity Act 2002 as applicable shall be complied with by the Project Investigator, the details of such obligations can be accessed at www.nbaindia.org
- 10.(I)** "The PIs/Implementing Agencies shall strictly adhere to the GoI instructions issued vide OM No.F.4.1.2021-PPD dated 30.6.2021 in the matter of issue of Global tender Enquiry with special reference to instructions contained under para 4 of the said OM for procurement of equipments, spares and consumables for research purposes and shall not issue Global Tenders Enquiries before seeking the approval of the competent authority".
- (II)** "After incurring the expenditure on import of such items and at the time of submission of UCs to the department next year, the PIs will also furnish the copy of the approval sought from the competent authority for issue of the GTE for such items of import. The release of next installment of grant will be subject to the fulfillment of the above condition."

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वैज्ञानिक 'ई' / Scientist 'E'
बायोटेक्नोलॉजी विभाग / Deptt. of Biotechnology
विज्ञान और प्रौद्योगिकी, संसद भवन / M/o Science & Tech,
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

- 11.If any biological data as specified in the guidelines are being generated in the project then PI should submit the data generated in the project to Indian Biological Data Centre – The National Repository being implemented at Regional Centre for Biotechnology, Faridabad in compliance with the Biotech-PRIDE Guidelines 2021.
- 12.This issues under the power delegated to this Department and with the concurrence of IFD vide their SAN No.102/IFD/SAN/3134/2021-2022 dated **March, 09 2022.**
- 13.This sanction order has been noted at serial no. 172-173 in the Register of Grants.

Vaishali

(Dr. Vaishali Panjabi)
Scientist 'E'

डॉ. वैशाली पंजाबी / Dr. VAISHALI PANJABI
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बायोटेक्नोलॉजी विभाग / Dept. of Biotechnology
विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

To,
The Pay & Accounts Officer,
Department of Biotechnology,
New Delhi – 110 003.

Copy to:

- 1 The Principal Director of Audit (Scientific Departments), DACR Building, New Delhi- 110 002.
- 2 Prof. S.K. Barik(Project Co-ordinator), National Botanical Research Institute, Lucknow - 226001, India
- 3 The Director , North Eastern Regional Institute of Science And Technology, NIRJULI, Itanagar - 791109, Arunachal Pradesh
- 4 The Director, CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow-226001, Uttar Pradesh
- 5 The Director, Institute of Bioresources and Sustainable Development, Takyelpat, Imphal - 795001, Manipur
- 6 The Registrar, Assam (Central) University, Silchar, DARGAKONAH, Silchar - 788011, Assam
- 7 The Registrar, Jai Narain Vyas University, Mohanpura Overbridge, Ratanada, Jodhpur - 342003, Rajasthan
- 8 The Registrar, North-Eastern Hill University, Shillong, NEHU Permanent Campus, Shillong - 793022, Meghalaya
- 9 The Registrar, Tripura University, Suryamaninagar, Agartala - 799022, Tripura
- 10 Dr. Debjyoti Bhattacharyya, Assistant Professor, Department of Life Science & Bioinformatics, Assam (Central) University, Silchar - 788011, Assam
- 11 Dr. Nisha Tak, Assistant Professor, Department of Botany, Faculty of Science, Jai Narain Vyas University New Campus, Pali Road, Jodhpur - 342001, Rajasthan
- 12 Dr. Padmaraj Gajurel, Associate Professor, North Eastern Regional Institute of Science & Technology (NERIST), (Demeed University), Nirjuli- 791109, Arunachal Pradesh
- 13 Dr. Panna Das, Assistant Professor, Department of Botany, Tripura University, Suryamaninagar, Tripura - 799022, Tripura
- 14 Dr. Poonam C Singh, Senior Scientist, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
- 15 Dr. Prabodh Kumar Trivedi, Senior Principal Scientist, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
- 16 Dr. Puneet Singh Chauhan, Senior Scientist, Microbial Technologies, CSIR-

- National Botanical Research Institute, ana Pratap Marg, Lucknow - 226001, Uttar Pradesh
- 17 Dr. Sanjeev Kumar, Associate Professor, Dept of Life SCience & Bioinformatics, Assam (Central) University, Silchar - 788011, Assam
 - 18 Dr. Sarangthem Indira Devi, Scientist D, Microbial Biotechnology, Microbial Resources Division, Institute of Bioresources and Sustainable Development (IBSD), , Takyelpat, Imphal-795001, Manipur
 - 19 Dr. Satya Narayan Jena, Principal Scientist, Plant Molecular Genetics, CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow - 226001, Uttar Pradesh
 - 20 Dr. Shweta Jha, Assistant Professor, Department of Botany, Faculty of Science, Jai Narain Vyas University, New Campus, Pali Road, Jodhpur - 342001, Rajasthan
 - 21 Dr. Sorokhaibam Sureshkumar Singh, Associate Professor, Department of Forestry, North Eastern Regional Institute of Science & Technology (NERIST), (Demeed University), Nirjuli-791109, Arunachal Pradesh
 - 22 Dr. Suchi Srivastava, Senior Scientist, Plant Microbe Interaction Division, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
 - 23 Dr. Sunil S Thorat, Scientist-D, Bioresources Database Unit, Institute of Bioresources and Sustainable Development, IBSD, Imphal - 795001, Manipur
 - 24 Prof. Hukam S Gehlot, Professor, Department of Botany, Jai Narain Vyas University, New Campus, Pali Road, Jodhpur, odhpur - 342001, Rajasthan
 - 25 Prof. Piyush Pandey, Professor, Department of Microbiology, Assam (Central) University, - 788011, Assam
 - 26 Prof. Santa R Joshi, Professor, Department of Biotechnology & Bioinformatics, North-Eastern Hill University, Shillong, - 793022, Meghalaya
 - 27 Prof. Saroj K Barik, Director, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
 - 28 Cash Section, DBT (2 copies).
 - 29 Sanction Folder.
 - 30 File Copy.

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(Dr. Vaishali Panjabi)
Scientist 'E'

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विज्ञान और प्रौद्योगिकी मंत्रालय / Min. Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

Annexure -I

Details of the Equipment sanctioned for the implementation of the project entitled "**Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers**":

North-Eastern Hill University, Shillong			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Deep Freezer (-80°C) 500L	1	500000.00
Total			500000.00
Assam (Central) University, Silchar			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Gel-Doc EZ System	1	500000.00
Total			500000.00
Tripura University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Incubator	1	200000.00
Total			200000.00



(Dr. Vaishali Panjabi)
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बायोटेक्नोलॉजी विभाग / Deptt. of Biotechnology
विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

Annexure -II

Details of the manpower sanctioned for the implementation of the project entitled **"Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers"**:

Head	No. of Position	Year I	Year II	Year III	Total (Rs.)
1. Assam (Central) University, Silchar					
Project Associate Project Associate I/II Rs. 35000/-+ 8% HRA	2	0	0	907200	907200
Project Associate Project Associate I/II Rs. 31000/-+ 8% HRA	2	803520	803520	0	1607040
Total(Rs.)		803520	803520	907200	2514240
2. CSIR-National Botanical Research Institute					
Project Associate Project Associate I/II Rs. 25000/-+16% HRA	2	696000	696000	0	1392000
Project Associate Project Associate I/II Rs. 28000/-+16% HRA	2	0	0	779520	779520
Total(Rs.)		696000	696000	779520	2171520
3. Institute of Bioresources and Sustainable Dvelopment					
Project Associate Project Associate I/II Rs. 31000/-+ 8% HRA	2	803520	803520	0	1607040
Project Associate Project Associate I/II Rs. 35000/-+ 8% HRA	2	0	0	907200	907200
Total(Rs.)		803520	803520	907200	2514240
4. Jai Narain Vyas University					
Project Associate Project Associate I/II Rs. 31000/-+16% HRA	2	863040	863040	0	1726080
Project Associate Project Associate I/II Rs. 35000/-+16% HRA	2	0	0	974400	974400
Total(Rs.)		863040	863040	974400	2700480
5. North Eastern Regional Institute of Science And Technology					
Project Associate Project Associate I/II Rs.31000/-+ 8% HRA	2	803520	803520	0	1607040
Project Associate Project Associate	2	0	0	907200	907200

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I/II Rs.35000/-+ 8% HRA					
Total(Rs.)		803520	803520	907200	2514240
6. North-Eastern Hill University, Shillong					
Project Associate Project Associate I/II Rs. 31000/- +16% HRA	2	863040	863040	0	1726080
Project Associate Project Associate I/II Rs. 35000/- +16% HRA	2	0	0	974400	974400
Total(Rs.)		863040	863040	974400	2700480
7. Tripura University					
Project Associate Project Associate I/II Rs.31000/-+ 8% HRA	1	401760	401760	0	803520
Project Associate Project Associate I/II Rs.35000/-+ 8% HRA	1	0	0	453600	453600
Total(Rs.)		401760	401760	453600	1257120

Emoluments detail of research personal(s) mentioned in table(s) of Annexure-II shall be applicable only if candidate(s) met educational qualification and eligibility criteria as per DST OM No. SR/S9/Z-05/2019 dated 10.07.2020.

Vaishali

(Dr. Vaishali Panjabi)
Scientist 'E'

डॉ. वैशाली पंजाबी / Dr. VAISHALI PANJABI
वैज्ञानिक 'ई' / Scientist 'E'
बायोटेक्नोलॉजी विभाग / Deptt. of Biotechnology
विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

No. BT/PR24584/NER/95/762/2017
GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Appl. No.: Agri/2017/08

Block 2, 6-8th Floors
CGO Complex, Lodhi Road,
New Delhi- 110 003
Dated: 06/06/2018

ORDER

Sanction of the President is hereby accorded, under Rule 18 of the Delegation of Financial Powers Rules, 1978, for the implementation of the project entitled: **"Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range"** for a period of 3 Year 0 Month at a total cost of Rs. 10526988 (Rupees One Crores Five Lakhs Twenty Six Thousand Nine Hundred and Eighty Eight Only) on the terms and conditions detailed here under:-

2 The Project :

2.1 Title : **"Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range"**

2.2 Details of the Investigators:

Project Coordinator

Prof. Chitta Ranjan Deb

Professor

Department of Botany

Nagaland University

Department of Botany,

Nagaland University, Headquarters: Lumami 798627, Zunheboto,
Nagaland, 798627

Principal Investigators:

M. Asha

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Jal Narain Vyas University
JODHPUR (Raj.)

Prof. Chitta Ranjan Deb
Professor
Department of Botany
Nagaland University
Department of Botany,
Nagaland University, Headquarters:
Lumami 798627,
Zunheboto, Nagaland, 798627

Prof. Hukam Singh Gehlot
Professor
Botany
Jai Narain Vyas University
Department of Botany, Faculty of
Science, New Campus, Pali Road,
J.N.Vyas University, Jodhpur PIN:
342001, Jodhpur, Rajasthan,
342001

Prof. Satyawada Rama Rao
Professor
Department of Biotechnology and
Bioinformatics
North-Eastern Hill University
Department of Biotechnology &
Bioinformatics,
North-Eastern Hill University,
Shillong 793022,
Shillong, Meghalaya, 793022

CO-PI:

Dr. Asosii Paul
Assistant Professor
Botany
Nagaland University
Department of Botany, Nagaland University,
Lumami-798627, Zunheboto - 798627,
Nagaland

Dr. Nisha Tak
Assistant Professor
Botany
Jai Narain Vyas University
Department of Botany, Faculty of Science, New
Campus, Pali Road, J.N.Vyas University,
Jodhpur, Jodhpur - 342001, Rajasthan

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Jai Narain Vyas University
JODHPUR (Raj.)

Dr. Nisha Tak
(PE)

Dr. Asosii Paul

2.3 Objectives:

Overall Objectives:

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains.
3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories

Institute wise Objectives:

Jai Narain Vyas University

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy.
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains.
3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories.

Nagaland University

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy.
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains

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Jai Narain Vyas University
JODHPUR (RAJ.)

3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories

North-Eastern Hill University

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy.
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains.
3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories.

2.4 Time Schedule:

The duration of the project is 3 Year 0 Month from the date of this sanction order.

2.5 Project Cost:

The total cost of the project is Rs. 10526988/- (Rupees One Crores Five Lakhs Twenty Six Thousand Nine Hundred and Eighty Eight Only) as per details given below :

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Institute	Year I	Year II	Year III	Total Cost(Rs.)
1. Jai Narain Vyas University	1908000	910000	902996	3720996
2. Nagaland University	1782000	880000	869996	3531996
3. North-Eastern Hill University	1461000	910000	902996	3273996
Total (Rs.)	5151000	2700000	2675988	10526988

Institute wise details are:

Budget Head	Year I	Year II	Year III	Total(Rs.)
1. Jai Narain Vyas University				
Equipment	998000.00			998000.00
Manpower	360000.00	360000.00	402996.00	1122996.00
Travel	50000.00	50000.00	50000.00	150000.00
Overhead	100000.00	100000.00	100000.00	300000.00
Consumables	350000.00	350000.00	300000.00	1000000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1908000.00	910000.00	902996.00	3720996.00
2. Nagaland University				
Equipment	902000.00			902000.00
Manpower	330000.00	330000.00	369996.00	1029996.00
Overhead	100000.00	100000.00	100000.00	300000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Travel	50000.00	50000.00	50000.00	150000.00
Consumables	350000.00	350000.00	300000.00	1000000.00
Total (Rs.)	1782000.00	880000.00	869996.00	3531996.00
3. North-Eastern Hill University				
Equipment	551000.00			551000.00
Manpower	360000.00	360000.00	402996.00	1122996.00
Consumables	350000.00	350000.00	300000.00	1000000.00

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JODHPUR (Raj.)

B. K. Mehta
(P.L.)

W. S. Mehta

Travel	50000.00	50000.00	50000.00	150000.00
Overhead	100000.00	100000.00	100000.00	300000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1461000.00	910000.00	902996.00	3273996.00

2.6 Equipment:

The details of the equipment sanctioned for the Implementation of the project at
Annexure-I

2.7 Manpower:

The details of the manpower sanctioned for the Implementation of the project at
Annexure-II

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JODHPUR (Raj.)

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3. Head of Account:

The **Non-Recurring** expenditure involved is debitable to:

Demand No. 85	Department of Biotechnology
3425	Other Scientific Research 2018-2019
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance for Research and Development
3425.60.200.29.17.35	Grants for creation of capital assets

The **Recurring** expenditure involved is debitable to:

Demand No. 85	Department of Biotechnology
3425	Other Scientific Research 2018-2019
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance for Research and Development
3425.60.200.29.17.31	Grants-In-Aid General

4. Terms & Conditions:

Additional Terms and Conditions specific for Twinning R and D program for NER:

- Both NER and Rest of India RoI Institutions scientists should work together for the objectives stated in the sanction of the project and any deviation from this would attract closure of the project at any point of time.
- In the project review meetings, both the PIs from NER and RoI Institutions should participate and make presentation.
- The outcomes of the project such as research papers, patents, copy rights etc. should be made jointly.
- The NER Scientists are to be trained at the collaborating institute appropriately to empower the NER Scientists.
- The project personal such as Research Associate, JRF or SRF, Research Assistant are also to be trained at least once in the collaborating national institute.
- The collaborating institute scientist should visit NER Institutions more frequently to guide NER scientists in design and conduct of experiments.

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Jawahar Vyas University
JODHPUR (Raj.)

- 4.1 The other terms and conditions governing this sanction are attached at Annexure- III.
- 4.2A Memorandum of Agreement (MoA) will be signed between the Department of Biotechnology and the grantee institution on Non-Judicial stamp paper Rs. 100/- in the enclosed format and the second release/installment will be made only after signing of MoA by the grantee institutions and its acceptance by DBT. In case of NGO or Private Institution, MOA signed is mandatory first release. A format of the MoA is enclosed in Annexure-IV
- 4.3The Institute/Agency will keep the whole of the grant in a Bank Account earning Interest, and the interest so earned should be reported to DBT in the Utilisation Certificate and Statement of Expenditure. The Interest so earned will be treated as created to the Institute/Agency and shall be adjusted towards further installment of the grant and or at the time of Final Settlement of Accounts.
- 5.No International Travel will be undertaken from the sanctioned project grant unless specified otherwise.
- 6.The Registrar, Jai Narain Vyas University, Jodhpur, Rajasthan and The Registrar, Nagaland University, Zunheboto, Nagaland and The Registrar, North-Eastern Hill University, Shillong, Meghalaya would be responsible for submission of Statements of Expenditure (SoE), utilization certificates (UC), Assets Certificates, Manpower staffing & expenditure details in prescribed DBT formats to DBT in respect of grants released in this project from time to time.
- 7.PI's of DBT sponsored projects can consider appointment of JRF from Category-II merit list of DBT-BET exam so that candidates can be paid fellowships at par with NET/GATE/BET qualified candidates as per DST OM No. A.SR/S9/Z-09/2012 dated on 21 Oct 2014. However, there is no compulsion on PI's to select candidates for JRF in their projects from Category-II of DBT-BET.
- 8.As per Rule 236 (1) of GFR 2017, the accounts of all Grantee Institutions or Organisations shall be open to inspection by the sanctioning authority and audit, both by the Comptroller and Auditor General of India under the provision of CAG(DPC) Act 1971 and Internal audit by the Principal Accounts Office of the Ministry or Department, whenever the Institution or Organisation is called upon to do so.
- 9.If the Research Project involves biological resource, the obligations under the Biological Diversity Act 2002 as applicable shall be complied with by the Project Investigator, the details of such obligations can be accessed at www.nbaIndia.org
- 10.This Issues under the power delegated to this Department and with the concurrence of IFD vide their SAN No.102/IFD/SAN/348/2018-2019 dated May, 15 2018.
- 11.This sanction order has been noted at serial no. 43-44 in the Register of Grants.

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

To,
The Pay & Accounts Officer,
Department of Biotechnology,
New Delhi - 110 003.

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REGISTRAR
Jai Narain Vyas University
JODHPUR (Raj.)

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Copy to:

- 1 The Principal Director of Audit (Scientific Departments), DACR Building, New Delhi- 110 002.
- 2 Prof. Chitta Ranjan Deb(Project Co-ordinator), Department of Botany, Nagaland University, Lumami 798 627, Nagaland, India
- 3 The Registrar, Jal Narain Vyas University, Mohanpura Overbridge, Ratanada, Jodhpur - 342003, Rajasthan
- 4 The Registrar, Nagaland University, ., Zunheboto - 798627, Nagaland
- 5 The Registrar, North-Eastern Hill University, P.O: NEHU Campus, Mawkyntoh Umshing,, Shillong - 793022, Meghalaya
- 6 Dr. Asosli Paul, Assistant Professor, Botany, Nagaland University, Department of Botany, Nagaland University, Lumami-798627, Zunheboto - 798627, Nagaland
- 7 Dr. Nisha Tak, Assistant Professor, Botany, Jal Narain Vyas University, Department of Botany, Faculty of Science, New Campus, Pali Road, J.N.Vyas University, Jodhpur, Jodhpur - 342001, Rajasthan
- 8 Prof. Chitta Ranjan Deb, Professor, Department of Botany, Nagaland University, Department of Botany, Nagaland University, Headquarters: Lumami 798627, Zunheboto - 798627, Nagaland
- 9 Prof. Hukam Singh Gehlot, Professor, Botany, Jal Narain Vyas University, Department of Botany, Faculty of Science, New Campus, Pali Road, J.N.Vyas University, Jodhpur PIN: 342001, Jodhpur - 342001, Rajasthan
- 10 Prof. Satyawada Rama Rao, Professor, Department of Biotechnology and Bioinformatics, North-Eastern Hill University, Department of Biotechnology & Bioinformatics, North-Eastern Hill University, Shillong 793022, Shillong - 793022, Meghalaya
- 11 Cash Section, DBT (2 copies).
- 12 Sanction Folder.
- 13 File Copy.

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

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Jal Narain Vyas University
JODHPUR (Ref.)

Annexure -I

Details of the Equipment sanctioned for the implementation of the project titled "Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range":

Jai Narain Vyas University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	High Tech Poly house- Size: 16 X 32 feet	1	502000.00
2.	Growth Chamber/Glass house Size: 14' x 10' x 10' : 8' feet (L x W x H on one side : at other side)	1	266000.00
3.	High capacity (1000 lits) vertical refrigerators (1-10 degree Celsius) with stabilizer	1	230000.00
Total			998000.00
Nagaland University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	96 well Gradient Thermal Cycler with 2 KVA UPS	1	402000.00
2.	Electrophoresis systems with power pack (4 channel power supply) and accessories (gel caster, gel tray, combs etc)	1	160000.00
3.	-20 Degree Celsius Deep Freezer (Vertical) with stabilizer	1	160000.00
4.	1-10 Degree Celsius Laboratory Freezer with stabilizer (625 lits)	1	180000.00
Total			902000.00
North-Eastern Hill University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Gas Chromatograph (GC) for Acetylene Reduction Assay (ARA)	1	551000.00
Total			551000.00

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

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Jai Narain Vyas University
JODHPUR (RAJ.)

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Annexure -II

Details of the manpower sanctioned for the implementation of the project titled "Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range":

Head	No. of Position	Year I	Year II	Year III	Total (Rs.)
1. Jal Narain Vyas University					
Junior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1	360000.00	360000.00		720000.00
Senior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1			402996.00	402996.00
Total(Rs.)		360000.00	360000.00	402996.00	1122996.00
2. Nagaland University					
Junior Research Fellow Manpower + 10% HRA	1	330000.00	330000.00		660000.00
Senior Research Fellow Manpower + 10% HRA	1			369996.00	369996.00
Total(Rs.)		330000.00	330000.00	369996.00	1029996.00
3. North-Eastern Hill University					
Junior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1	360000.00	360000.00		720000.00
Senior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1			402996.00	402996.00
Total(Rs.)		360000.00	360000.00	402996.00	1122996.00

Emoluments detail of research personal(s) mentioned in table(s) of Annexure-II shall be applicable only if candidate(s) met educational qualification and eligibility criteria as per DST OM No.SR/S9/Z-09/2012 dated 21.10.2014.

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

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Jal Narain Vyas Univ
JODHPUR (Raj)

3.7.1.1: Total number of Collaborative activities with other institutions/ research establishing/industry for research and academic development of faculty and students year wise during the last five years							Link to the rele
Sl. No.	Title of the collaborative activity	Name of the collaborating agency with contact details	Name of the participant	Year of collaboration	Duration	Nature of the activity	
1	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	BHERA RAM	2020	14/04/2020 to 12 /05/2020	Asteroid Search	
2	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Hemakshi parmar	2020	14/04/2020 to 12 /05/2020	Asteroid Search	
3	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Dimpy choudhary	2020	14/04/2020 to 12 /05/2020	Asteroid Search	
4	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	BHERA RAM	2020	12/06/2020 TO 10/07/2020	Asteroid Search	
5	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	BHERA RAM	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
6	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	KAJOL KASERA	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
7	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	SONU CHOJHAN	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
8	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	PRAVEEN KUMAR	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
9	Asteroid search Campaigns	International astronomical search collibration	BHERA RAM	2020	12/06/2020 TO 10/07/2020	Asteroid Search	
10	Asteroid search Campaigns	International astronomical search collibration	BHERA RAM	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
11	Asteroid search Campaigns	International astronomical search collibration	Hemakshi parmar	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
12	Asteroid search Campaigns	International astronomical search collibration	Dimpy choudhary	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
13	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Anitra godra	2020	09/10/2020 TO 03/11/2020	Asteroid Search	
14	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Heena kanwar	2020	09/10/2020 TO 03/11/2020	Asteroid Search	
15	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Heena kanwar	2020	02/08/2020 TO 27/08/2020	Asteroid Search	
16	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Akhita awasti	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
17	Application of geoinformatics in ecology	INDIAN INSTITUTE OF REMOTE SENSING	Kajol Kasera	2020	13/07/2020 TO 24/07/2020	online mode	
18	Earth Observation for carbon cycle stud	INDIAN INSTITUTE OF REMOTE SENSING	Urvashi soni	2021	21/06/2021 TO 25/06/2021	online mode	
19	Earth Observation for carbon cycle stud	INDIAN INSTITUTE OF REMOTE SENSING	Anjali Palariya	2021	21/06/2021 TO 25/06/2021	online mode	
20	Asteroid search Campaigns	International astronomical search collibration	Ram raj mali	2020	09/10/2020 TO 03/11/2020	Asteroid Search	
21	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Shobha kumari	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
22	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Praveen Kumar	2020	12/08/2020 TO 08/09/2020	Asteroid Search	



Prof. & Head
Department of Chemistry
J.N.V. University, Jodhpur

MOHANLAL SUKHADIA UNIVERSITY : UDAIPUR

No.PD/OS/SPD-(RUSA-Phase-II)/CSA-1-(3)/2020-21 243

dt: 20-08-2020

21

ORDER

In pursuance of MHRD Deptt. of Hr. Edu. New Delhi sanction letter No. 2447/2014-U.Policy (RJMMulti-Gen) dt: 03-02-2020 & Govt. of Rajasthan, State Project Directorate-RUSA, Jaipur letter No. F.30(16)/SPD/RUSA/2016/178 dt: 31-03-2020 & No. 316 dt: 06-08-2020, I am directed to convey financial sanction for payment of **Rs. 1750 lakh (Rupees seventeen Crore fifty Lakh)** only to the Dean/Director/Head of the Departments of concerned Colleges, MLSU, Udaipur for arranging payment to the Principal Investigator of Research Project as per list enclosed, as 1st Installment under Component 10: Research Innovation and Quality Improvement (Research Proposals) under RUSA-2.

Admissible expenditure be incurred as per relevant rules/procedure of sponsoring agency/State Project Directorate-RUSA Jaipur as well as of this University rules and as per guidelines of Nodal Officer-RUSA (enclosed vide No. RUSA/NODAL OFF./2016-17/163 dt: 14-08-2020) it shall be met out of Central/State Agencies budget under head **"CSA-1-(3)-IV-RI&QI (Research Proposals)-7-B-(a)-(i) / 7-B-(a)-(ii) / 7-B-(a)-(iii) / 7-C-(a)-(i) / 7-D-(i) / 7-D-(ii) / 7-E(a)-(i) / 7-E(a)-(ii) / 7-E(b)-(i) / 7-E(b)-(ii) / 7-F-(i) / 7-F-(ii) / 7-F-(iii) / 7-G-(i) / 7-I(a)-(i) / 7-K-(i) / 7-K-(ii) / 7-K-(iii) / 7-K-(iv) / 8-B-(i) / 8-C-(i) / 8-D-(i) / 9-A / 9-B-(i) / 9-C-(i) / 9-C-(ii) / 9-C-(iii) / 9-C-(iv) / 9-D-(i) / 9-E-(i) / 9-E-(ii) / 9-F-(i) / 9-F-(ii) / 9-G-(i) / 9-G-(ii) / 9-H-(i) / 9-H-(ii) / 9-I-(i) / 9-J-(i) / 9-K-(i) / 9-L-(i) / 9-L-(ii) / 9-P-(i) / 11-A-(i) / 11-A-(ii) / 11-A-(iii) / 11-A-(iv) / 11-A-(v) / 11-A-(vi) / 11-A-(vii) / 11-A-(viii) / 11-A-(ix) / 11-A-(x) / 12-(i) / 12-(ii) / 12-(iii) / 12-(iv)"** where in necessary provision shall be made in Revised Estimates 2020-21.

COMPTROLLER

Copy to:-

1. The Registrar, MLSU, Udaipur.
2. The Dean, UCCMS/UCoS/UCSSH, MLSU, Udaipur.
3. Prof. Kanika Sharma, Nodal-officer, RUSA-Programme, Deptt. of Botany, UCoS, MLSU, Udaipur with ref. to letter No. RUSA/NODAL OFF./2016-17/163 dt: 14-08-2020.
4. The Head Department of Physics/Chemistry/Botany/Zoology/Maths. & Stats./Env. Sci./ Geology/Pharmacy, UCoS, MLSU, Udaipur.
5. The Director, Computer Centre, MLSU, Udaipur.
6. The Head, Deptt. of Economics / English / Geography / Hindi / History / Library Sci. / Political Sci./ Psychology / Readymade Garments / Sociology / Incharge-Centre for Women Studies, UCSSH, MLSU, Udaipur.
7. The Head, Deptt. of Acctts. & Stats./B.B.E./Bus. Adm., UCCMS, MLSU, Udaipur.
8. The P.S. to Hon'ble Vice-Chancellor, MLSU, Udaipur.
9. The S.O. Bill/Compilation/Cheque, MLSU, Udaipur.
10. The R.E. File 2020-21.
11. The Officer Incharge, University Website, MLSU, Udaipur.
12. Guard file.

DY COMPTROLLER

List of R & I Project proposals approved by MHRD for Financial Grant under RUSA2.0

S.No	Department	Principal Investigator	Co-Investigator	Project Title	Total Amt.	Sanctioned Amount (1st Instalment)
					Budget Head- CSA-1(3)-IV	
1	Biotechnology	Dr. Nitish Rai	Dr. Namita Ashish Singh, Dr. Vivek Jain, Dr. Avinash Marwal	Evaluation of ne neuroprotective effect and its underlying molecular mechanism by Costus Speciosus, a traditional medicinal plant of Udaipur district, Rajasthan	3000000 7-E(b)-(i)	1500000
2	Biotechnology	Dr. Harshada Joshi	Dr. Avinash Marwal	Screening and Use of Calcite Solubilizing Bacteria for Restoration of Marble Slurry Contaminated Soil	3000000 7-E(b)-(ii)	1500000
3	Botany	Prof. Kanika Sharma	Dr. G.S. Deora, Dr. Vinit Soni, Dr. Rohini Trivedi, Dr. Jaya Arora, Dr. Harish, Dr. Kuldeep Sharma, Dr. Amit K. Gupta, Dr. Tripta Jain, Dr. Mukesh Meena	Capacity building and livelihood security of tribals of south Rajasthan through bioprospecting, biotechnological interventions and disease management of ginger	30598480 7-E(a)-(i)	15299240

[Signature]
 Head Office, RUSA
 MHRD

4	Chemistry	Dr. Jyoti Choudhary	Prof. Pinki Bala Punjabi, Dr. Shikha Agrawal, Dr. Poonam Khandelwal, Dr. Chetna Ameta, Dr. Dinesh Pandey, Dr. Neetu Kumari, Dr. Dinesh Kumar Yadav, Dr. Nitin Kumar, Dr. Prabh Kumar Baroliya, Dr. Sidharth Sharma, Dr. Rama Kanwar Khangarot, Dr. Gangotri Pemawat, Dr. Lokesh Kr. Agrawal, Ms. Himanshu Sharma, Dr. Pradhuman Singh Ranawat, Dr. Tarun Kumar, Dr. Devendra Singh, Mr. Vipin Khokher, Ms. Kiran Meena	Novel natural products from traditional medicinal plants of South Rajasthan region: Structural, synthetic and biological studies	47500000	23750000
			7-C-(a)-(i)			
5	Computer Sc.	Dr. Avinash Panwar	Prof. Deepak Khazanchi, Prof. K. Srinivas, Dr. Sumangla Rathore	A Customizable LMS for proper utilization and adoption of Global Knowledge Pool: An adaptation of contingency theory of E-learning	29295000	14647500
			7-I(a)-(i)			

Nodal Officer, USA
MLSD

6	Env. Science	Prof. B.R. Bamania	Prof. Nidhi Rai, Dr. D.S. Rathore, Dr. Anuya Verma	Environmental issues of urban & rural tribal areas of Southern Rajasthan	26538000 7-A-(i)	13269000
7	Geology	Prof. S.R. Jakhar	Ms. Neha Rathi	Remote Sensing Based Study of Dessicated Lik River of the Thar Desert for Demarcating its course, its Rejuvenation Possibilities and Social Benefits	2020000 11-A-(i)	1010000
8	Geology	Dr. Maya Choudhary	Prof. (Retd.) M.L. Nagori	Study of Ostracods and Foraminifers from the Bagh Group (Upper Cretaceous) of Lower Narmada Valley: Determination of Age (OAE2 and OAE3) events and their Paleogeographic Implications	3035000 11-A-(ii)	1517500
9	Geology	Dr. Harish Kapasya	Dr. Ritesh Purohit	A Study of Tectonic Evolution of the Neoproterozoic metasediments from Southern parts of Pali districts of Rajasthan	2950000 11-A-(iii)	1475000
10	Geology	Dr. Ankush Srivastava	Dr. Ashutosh K. Singh	Investigating the role of interoceanic exchange on Indian Ocean surface head redistribution and its impact on Indian monsoon during Quaternary: A multi-proxy approach	4159000 11-A-(iv)	2079500
11	Geology	Dr. Anjali Singh	Dr. Sudhir Kumar, Dr. Avner Vengosh	Assessment of Ground Water Quality and mapping Human Health Risk of Drinking Ground Water Resources in Rajasthan State, India	4844000 11-A-(v)	2422000
12	Geology	Mr. Akhil Kumar Dwivedi	Prof. Jayanta Kumar Pati, Dr. Anil Dutt Shukla, Dr. Ritesh Purohit	Heavy Metal approportionment of Geogenic and Anthropogenic sources in Ganga River using Geomagnetic and Geochemical studies	4175000 11-A-(vi)	2087500

Nodal Officer
MLSU

13	Geology	Mr. Niranjana Mohanty	Dr. Ritesh Purohit, Dr. Rajnikant Patidar	Geochemistry and Isotope systematic of Ultramafic rocks of Phulad shear zone, Aravalli-Delhi fold belt, North West India: Implication on Geodynamic significance and Platinum Group Elements (PGEs) Metallurgy	3702800	1851400
					11-A-(vii)	
14	Geology	Mr. Rajanikant Patidar	Mr. Niranjana Mohanty	Geology, Geochemistry and Petrogenesis of Carbonates and Associated Rocks of Sirwasan area district Chota Udepur, Gujarat	2287800	1143900
					11-A-(viii)	
15	Geology	Mr. Subhash Chandra Janagal	---	Study of Mineralogical and Thermo-mechanical Properties of Clay Deposit from Bikaner district, Rajasthan.	1775000	887500
					11-A-(ix)	
16	Geology	Prof.(Retd.) Vinod Agrawal	Dr. Harish Kapasya	Geological and Geotechnical Studies of Commercial Marbles of Rajasthan	4104000	2052000
					11-A-(x)	
17	Maths & Stats.	Dr. Mahesh Puri Goswami		Applications of Bicomplex algebra to fundamental Electromagnetics using fractional calculus	542640	271320
					7-D-(i)	
18	Maths & Stats.	Dr. Pradeep Kumar Vishwakarma	Dr. Abhimanyu Singh Yadav	Bayesian Analysis of Lifetime Models- Application to the Survival Data	1321000	660500
					7-D-(ii)	
19	Pharmacy	Dr. Joohee Pradhan	Prof. Lalit Singh Chouhan, Dr. Shikha Agrawal	Conjunction Based Drug Design Approach in Search of Third Generation Anti epileptics: Design, Synthesis, Anticonvulsant Evaluation and Computer Aided Drug Design Studies of 4-(5-phenyl-1H-pyrazol-3-yl) Benzenamine derivatives.	5000000	2500000
					7-K-(i)	
20	Pharmacy	Dr. Garima Joshi	Dr. Deepak Choudhary, Dr. Harish	Design, Development and Characterization of Oral Nanoformulation for Treatment of Cancer	5000000	2500000
					7-K-(ii)	

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 Faculty Office
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21	Pharmacy	Dr. Saurabh K. Sinha	Prof. Lalit Singh Chauhan	Design, Synthesis, Evaluation and kinetic studies of derivatives of 4-aminopiperidine as potential antianemic and cognition enhancing agents.	5000000	2500000
22	Pharmacy	Dr. Vivek Jain	Prof. Lalit Singh Chouhan,, Dr. Nitish Rai	In-vitro and In-vivo screening of poly herbal formulation (PHF-1) in age induced Alzheimer disease in mice	7-1k - (ii)	
					5000000	2500000
23	Physics	Prof. B.L. Ahuja	Dr. Gunjan Arora, Dr. Lekhraj Meena	Measurement of magnetic Compton profiles of spintronics and magnetocaloric materials	7-1k - (iv)	
					11560720	5780360
24	Physics	Prof. N. Lakshmi	Prof. Sudhish Kumar, Dr. Ghanshyam Purohit, Dr. Dinesh Patidar	Development and optimization of energy conversion and storage materials based on perovskites, ferrites and graphene	7-B-(a)-(i)	
					9550000	4775000
25	Physics	Prof. M.S. Dhaka	Dr. Shikha Agrawal	Fabrication of stable and high efficiency perovskite solar cell device	7-B-(a)-(ii)	
					8829600	4414800
26	Zoology	Prof. Arti Prasad	Dr. Girima Nagda	Survey and Analysis of Pesticide Residues in Consumable products (Fruits and Vegetables) Obtained from Different Vegetable market (Sabzi mandis) of Udaipur Region	7-B-(a)-(iii)	
					12000000	6000000
27	Zoology	Prof. Arti Prasad	Dr. Devendra Kumar	Surveillance and insecticide resistance mapping against mosquitoes of malaria, dengue and chikungunya in Southern Rajasthan and Bacterial bio-pesticide as an urgent alternate tool for resistance management and vector control.	7-F-(i)	
					11980000	5990000
					7-F-(ii)	

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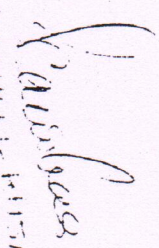
28	Zoology	Dr. Vijay Kumar Koli	Dr. K.S. Gopi Sundar	Resource partitioning of three sympatric Ibis species (red-naped, Black-headed and Glossy) in Dungarpur district, Rajasthan: diet, habitat and landscape selection across seasons.	2896000	1448000
29	Centre for Women Studies	Dr. Garima Mishra	---	Impact Assessment of Awareness about Women's Legal Rights through Advocacy of Course on 'Women and Legal Rights'	7-F-(iii)	
					935000	467500
					9-I-(i)	
30	Economics	Prof. Sanjay Lodha	Dr. Neha Paliwal	Exploring the Multidimensional Impact of MGNREGA : A Case Study of Rajasthan.	4000000	2000000
			Dr. Deepa Soni	(A) Impact of MGNREGA on Women Empowerment in Rajasthan		
			Mr. Mukesh Meena	(B) Impact of MNAREGA on Purchasing power of Beneficiaries	9-B-(i)	
			Dr. Anita Joya	(C) An Assessment of impact of assets creation in MNREGA		
			Dr. Vinita Rajpurohit	(D) Impact of MGNREGA on Financial Inclusion		
31	English	Prof. Seema Malik	Dr. P. Trikha, Dr. Bhanupriya Rohila, Mr. M.S.Purohit, Dr. Neetu Parihar, Dr. Suresh Salvi	(E) Impact of MGNREGA on migration and employment generation in Rajasthan		
				Folklore of Vagad Region: Mapping oral Traditions	3145000	1572500
					9-K-(i)	
32	Geography	Dr. Bhanwar Vaishvendra Raj Singh	Dr. Bijay Singh Meena	Inclusive & Sustainable Development of Bombara, Boria, Sulawas, Sihad Gram Panchayat: Smart Village Initiatives	2500000	1250000
				Prediction Model for Road Accidents: A Case Study of Udaipur City, India	9-C-(i)	
					1500000	750000
33	Geography	Dr. Sabiha Khan	---		9-C-(ii)	

34	Geography	Dr. D.S. Chouhan	Prof. Seema Jalan, Dr. Shailesh Chaure	Impact of Water Quality on Health in Vagad Region of Rajasthan: An Application in Web-GIS	3004000 9-c-(iii)	1502000
35	Geography	Prof. Seema Jalan	Dr. Shailesh Chaure, Dr. Urmi Sharma	Electoral Information System for Governanace and Developmental Planning: A G-Governance Initiative	5725000 9-c-(iv)	2862500
36	Hindi	Dr. Ashish Sisodia		Mewari-vagad bolion ka hindi da sath tulnatmak addhayan	750000 9-L-(i)	375000
37	Hindi	Dr. Navin Kumar Nandwana	---	Aadivasi samaj me parivartan aur samkalin hindi upanyas	1884000 9-L-(ii)	942000
38	History	Prof. Pratibha	Prof. Digvijay Bhatnagar, Dr. Peeyush Bhadviya, Dr. Kailash Chand Gurjar, Mr. Manish Shrimali	Evolving Strategies of Conserving Cultural Heritage of Udaipur	3003000 9-P-(i)	1501500
39	Library Sc.	Dr. P.S. Rajput	---	Automation of Libraty services: An easy access to electronic resources and enhancement of research activities	5475000 9-D-(i)	2737500
40	Mass Comm.	Dr. Kunjan Acharya		Contribution of mass media in socio-economic development of tribal sub plan areas of Rajasthan.	1540000 9-J-(i)	770000
41	Political Science	Prof. Sanjay Lodha	Dr. Sanjay Kumar	Analyzing Voting Behaviour in Rajasthan: Post- poll study of the 2019 Lok Sabha Elections	3838825 9-E-(i)	1919412
42	Political Science	Prof. Sanjay Lodha	Dr. Vijay Dixit, Dr. Satish Chand, Dr. Baludan Barathath	Impact of Social Welfare Policies on Voting Behaviour: Case study of Assembly Elections in Madhya Pradesh, Rajasthan and Gujarat, 2008- 2018	3603425 9-E-(ii)	1801713

43	Psychology	Prof. Kalpana Jain	Dr. Rashmi Singh, Dr. Hema Kumari Mehtar	Strength based development of tribal adolescents of Southern Rajasthan: An empirical study	2100000	1050000
44	Psychology	Dr. Tarun Kumar Sharma	---	Suicides in Kota: Understanding causes and preparing prevention strategies in the form of a documentary film	9-F-(i) 700000	350000
45	Readymade Garments	Dr. Dolly Mogra	Dr. Garima Mishra, Dr. Rupal Babel	Dimensions of Gender Discrimination in Textile Industry of Rajasthan	1196000	598000
46	Readymade Garments	Dr. Dolly Mogra	---	Empowering Entrepreneurial Skills Through Advocacy of "Fashion Design and Technology" Diploma Course	3788020	1894010
47	Sociology	Dr. Raju Singh	Dr. Sangeeta athwal	Research Skill Development in social Sciences, Communication and Management	9-H-(ii) 1500000	750000
48	Sociology	Prof. P.M. Yadav	Dr. Rajkumari Ahir	Government plans and policies related to mother-child health: A Comparative sociological study (Special reference to tribal society)	9-G-(i) 3800000	1900000
49	Accountancy and Statistics	Prof. G. Soral	Prof. Shurveer S. Bhanawat, Dr. Avinash Panwar, Dr. Shilpa Vardia, Dr. Shilpa Lodha, Dr. Asha Sharma, Dr. Parul Dashora, Sh. Pushpraj Meena	Blockchain Accounting : An Exploratory Research	5000000	2500000
					8-B-(i)	

Signature
 Modal Officer, PUC
 MLGU

50	Banking & Buss. Eco.	Prof. Renu Jatana	---	Changing India: Training and market access for organic farming	3543000	1771500
51	Business Adm.	Prof. Rajeshwari Narendran	Prof. Manju Baglmar, Dr. Hemraj Choudhary	Measuring the impact of Workplace Happiness upon individual & Organizational performance: An interdisciplinary Intervention with Yoga and Meditation	8-C-(i) 2935000	1467500
52	FMS	Prof. Anil Kothari	---	Economics of Temple- An empirical Study of Selected Temples of North India	8-D-(Ci) 1000000	500000
53	FMS	Prof. Hanuman Prasad	---	Digital Financial Awareness: A Study of 'X' and 'Y' Generation Citizens of Rajasthan	12-(ci) 1000000	500000
54	FMS	Prof. Meera Mathur	Dr. Shubham Goswami	Study on Sustainable Consumption Behaviour of Urban Consumers Towards Electronic Products in Rajasthan	12C(ii) 1500000	750000
55	FMS	Prof. Karunesh Saxena	---	Stress Management using Training Intervention Techniques among the Adolescent Students : A Study of major cities of Rajasthan.	12-(iv) 28370690	500000
56	Botany	Head, Botany		D S Kothari Central Research Facility	7-E (a)-(ii) 350000000	14185345
Total Rs.					350000000	175000000


 Noted
 MLSD

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COMPTROLLER
 Mohanlal Sukhadia University
 UDAIPUR



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Mohanlal Sukhadia University, Udaipur – 313039
Office of the Nodal Officer-RUSA, MLSU
(Rashtriya Uchhatar Shiksha Abhiyaan)



Prof. Kanika Sharma
Nodal Officer, RUSA
MLSU

RUSA/NODAL OFF./2016-17/ 163

Date: 14.08.2020

To
Comptroller,
Mohanlal Sukhadia University,
Udaipur.

Sub.: Financial Sanction for R & I Projects under RUSA 2.0
Ref.: No. F30(16)SPD/RUSA/2016/178 dated 31.03.2020

Dear Sir,

With reference to above you are requested to grant Financial sanction for the R & I proposals submitted and approved by MHRD under RUSA 2.0 as per the list enclosed so that work may be commenced on these projects.

Further you are requested to issue the sanction to individual PI with the instruction that all payments will be done through treasury after submission and approval of FVC bills by the PI. Also kindly issue the following guidelines to all PI with regard to the expenditure and implementation of project:

1. GF & AR i.e. Financial Rules and norms of Government of Rajasthan are to be followed.
2. The expenditure will be incurred as per the RUSA guidelines, PAB approvals and DPR submitted by the PI to the institution and forwarded to MHRD.
3. Proper accounts of the expenditure incurred out of the grant are to be maintained and ensure utilization of funds only under approved budget heads. A separate stock register and cash book must be maintained for RUSA grant.
4. Utilization certificate in the GFR 12-C showing clearly the actual expenditure incurred under various heads above and the unspent balance available with the PI, shall be furnished to the University, within 3 months from the receipt of the fund. Non submission of UC on time shall debar PI from release of next installment.
5. The final UC of complete grant supported by audited statement of expenditure to the effect that the grant has been utilized for the purpose for which it has been sanctioned shall be furnished to the SPD office by the institution on the basis of UC submitted by individual PI.
6. Audited record of assets acquired wholly or substantially out of the grant and a Register of Assets shall be maintained.
7. RUSA account details for receipts and payments shall be mapped on PFMS portal to facilitate fund transfer and monitoring.
8. The Council of SPD or its nominee shall have the right to check/verify the accounts to satisfy that the funds have been utilized for the purpose for which they were sanctioned.


Imp 2 Urgent
SOC Plan

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17/8/2020

- 15
9. FUND TRAKER FORM and Geotag Photographs on Bhuvan portal depicting the progress of implementation for activities carried out under the project are to be updated at periodic intervals showing three stage of implementation, i.e. (a) Before commencement, (b) The intermediate stage and (c) After the completion of the project.
 10. No constructions is allowed under RUSA2.0
 11. Any Renovation of existing facility will be allowed but only if it has been mentioned in the project proposal submitted to Rusa Nodal Officer.
 12. Renovated facility and Equipment created/ acquired under the grant should display the RUSA logo for which this grant is being used.
 13. Monthly progress report shall be submitted to the RUSA Nodal officer who will forward it to SPD RUSA for monitoring.
 14. Monitoring will be based on action plans submitted along with the proposals and achievements made with respect to a set of norms as defined by the institutional development plan.
 15. No change in the approved DCF/DPF/Proposals will be done at PI level. In case it is essential to undertake modification in the approved activities, the proposal for revision in DCF will first be discussed and approved in BOG of the institute and then submitted to SPD/RSHEC for approval of proposed changes with justification note and copy of BOG minutes.

Thanking you,

Yours Sincerely,



(Prof. Kanika Sharma)
Nodal Officer RUSA-MLSU

Noda. Officer RUSA-
MLSU

Applicant

First Name(s): **Robert**
Surname(s): **Popek**
Sex: ☒ M ☐ F Nationality: **Polish**
Place and date of birth: **Plock, Poland, 11.01.1984**
Home address: **Malborska 4/75**
Zip Code: **03-286** City: **Warsaw** Country: **Poland**
Passport No.: **AV 1291284**
Phone number: **+48787245973** E-mail: **robert.popek@gmail.com**
Education level: **Phd.**
Web references (if any):

Home Institution/Company (EU)

Name: **Institute of Dendrology, Polish Academy of Sciences**
Address: **Parkowa 5**
Zip Code: **62-035** City: **Kórnik** Country: **Poland**
Designation of the applicant: **Biologist**
Main responsibilities of the applicant: **Head of the scientific grant: Understanding the importance of trees and shrubs in phytoremediation of particulate matter in the air in urban areas.**
Website: **www.idpan.poznan.pl/**
Contact person (Director or Responsible): **Piotr Karolewski**
Designation of the contact person: **Director of Laboratory of Ecology**
Contact person Tel. No.: **+48-618170033** Email: **idkornik@man.poznan.pl**

Host Institution/Company (INDIA)

Name: **Jai Narain Vyas University**
Address: **New Campus, Jodhpur, Rajasthan, India**
Zip Code: **342001** City: **Jodhpur** Country: **India**
Website: **www.jnvu.edu.in**
Contact person: **Gyan Singh Shekhawat**
Designation of the contact person: **Gyan Singh Shekhawat**
Contact person Tel. No.: **+91-9414279665** Email: **gyans.shekhawat@gmail.com**

Requested grant

Requested duration of the mobility (specify months/days): **2 months**
Period of stay in India (broad period corresponding to invitation from host): **2 months**
More than one person will apply for this project? ☐ YES ☒ NO
Full Name of the other applicant(s):

Please attach: 1) a color scanned copy of the Passport; 2) a personal CV (possibly in EU format); 3) invitation letter from the host Institution/Company; 4) any other document that you think can help us to evaluate your project proposal.

Place and date: **Kórnik, 24.08.2017**

Signature of the Applicant

Signature of the Director of the Home Institution/Company

Faculty of Science
Jai Narain Vyas University, Jodhpur

Prof. Sunita Kumbhat
Dean

No. JNVU/Dean Sc./2017/ 699

28 Dec 2017

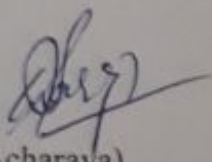
To,
Dr. Laura Micheli
Associate Professor in Analytical Chemistry,
University of Rome Tor Vergata
Via della Ricerca Scientifica 00133-Rome, Italy

Sub: Invitation to Dr. Laura Micheli, under TECO Program: Technological Eco-Innovation for the Quality Control and the Decontamination of polluted waters and Soils

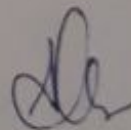
Dear Dr. Micheli,

We are happy to invite you to the Department of Chemistry, Faculty of Science, Jai Narain Vyas University, Jodhpur (Rajasthan) India, as host institute under TECO program and extend Laboratory space and research facilities to carry out research in the field of development of Sensors and Biosensors of environmental importance in collaboration with Dr. Sunita Kumbhat, Professor of Chemistry for a period of 1-2 Months during year 2018.

We look forward for a fruitful scientific collaboration with Department of Chemistry, JNV University, Jodhpur.



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In-vitro and *in-silico* determinations of HMG-CoA reductase inhibition potential of caffeic acid for therapeutics of hypercholesterolemia

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ABSTRACT

The recent study was aimed to investigate *in-vitro* and *in-silico* determinations of the 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase [HMG-CoA reductase (HMGCR)] inhibition potential of the caffeic acid. The *in-vitro* assay shown the IC₅₀ values of caffeic acid and pravastatin by 10.162 μ M and 40.6 nM which performed up to 83.29% and 85.83% inhibition of HMGCR, respectively. Consequently, the kinetics of inhibition of HMGCR showed significant values of K_m and V_{max} of the caffeic acid (0.360198 ± 0.04251 ; 11.8% and 91.0863 ± 1.65 ; 1.811%) and pravastatin (10.325 ± 0.9372) [9.077%; 94.2661 ± 2.458 (2.607%)]. Consequently, the molecular docking revealed significant binding energy, bond length, and H-bonding of caffeic acid with target enzyme of HMGCR. Accordingly, the interactions of protein-ligand complexes under cytosolic conditions were validated through root mean square fluctuation of molecular dynamics. Subsequently, the gastrointestinal absorption authenticated by the BOILED egg prediction is further validated by Absorption, Distribution, Metabolism, Excretion, And Toxicity (ADMET) assays and iLogP value. The drug likeness values of caffeic acid and pravastatin were found suitable as per the five rules of the Lipinski. Supportively, the toxicity profiles of the caffeic acid and pravastatin was made by the ProTox-II web server. Hence, it can be concluded that caffeic acid has the capabilities to inhibit HMGCR which provides the hypocholesterolemic potential.

INTRODUCTION

Voluminous data of the literature illustrated that the diet ingredients of fruit, vegetables, and plant parts having capabilities to manage hypercholesterolemia by the existing potent bioactive phytochemicals such as polyphenol, terpenoids, flavonoids, and alkaloids (Rastogi *et al.*, 2016). In a similar context, caffeic acid is a metabolite of hydroxycinnamate of the non-flavonoids phenolic acid mostly obtained from edible fruits, vegetables,

herbs, and stress climatic plants which are used in therapeutics of numerous ailments. This also exhibits numerous processed dietary sources because of antioxidant properties due to their free radical scavenging capabilities as well as potent ligand can interact with several metabolic targeted protein and enzymes (Agunloye and Oboh, 2018; Laranjinha and Cadenas, 1999). In plant metabolism, caffeic acid or caffeic acid-like compounds furnish a series of hydroxycinnamic acids (C6–C3) that vary from an individual by the quantity of hydroxy and methoxy groups on their phenyl unit (Park, 2009). These kinds of monophenol carboxylic acids are repeatedly found to be esterified to polyols. Accordingly, 3,4-dihydroxycinnamic acid (caffeic acid) is combatted in average-sized polyester branches of the tetraolquinic acid, i.e., 3,5-di-O-caffeoylquinic acid, that occurs in coffee beans. Along with

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RESEARCH ARTICLE

The interaction capabilities of phytoconstituents of ethanolic seed extract of cumin (*Cuminum cyminum* L.) with HMG-CoA reductase to subside the hypercholesterolemia: A mechanistic approach

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Abstract

The aim of this study was to evaluate hypocholesterolemic potential of phytoconstituents of ethanolic seed extract of cumin (*Cuminum cyminum* L.) by assessments of interaction capabilities with 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase (HMG-CoA) reductase through in vivo and in silico assessments along with screening of phytoconstituents of the test extract. The phytoconstituents of the test extract were identified by Gas chromatography-mass spectrometry (GC-MS)/MS examinations. The hypercholesterolemic rabbit animal model was used for in vivo study and further examined the lipid profile and atherogenic indices. The treatments of the test extract and standard drug (atorvastatin) caused significant reductions in dyslipidemia indices, that is, atherogenic index of plasma (AIP), Castelli Risk Index-I (CRI-I), CRI-II and atherogenic coefficient (AC). Accordingly, the molecular docking showed significant interactions between the cuminaldehyde and HMG-CoA reductase compared to the other phytoconstituents. Further, molecular dynamics (MD) validated the interaction capabilities through assessments of N-Substance, V-Volume, T-Temperature (NVT), N-Substance, P-Pressure, T-Temperature (NPT), Root Mean Score Deviation (RSMD), Root Mean Score Fluctuation (RSMF), radius of gyration, system density, and potential energy along with locality assessment of complex interactions evaluated by angle distribution, average angle interaction, free energy of solvation, and solvent accessible surface area (SASA). Subsequently, the absorption, distribution, metabolism, excretion and toxicity (ADMET) predictions revealed the druggability and bioavailability criteria of the leading identified compounds. On the basis of results obtained, it can be concluded that small phytochemical molecules of test extract of cumin (*Cuminum cyminum* L.) have capabilities to inhibit the HMG-CoA reductase and ameliorate the dyslipidemia indices.

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Downregulation of Candidate Gene Expression and Neuroprotection by Piperine in Streptozotocin-Induced Hyperglycemia and Memory Impairment in Rats

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There is accumulating evidence showing that hyperglycemia conditions like diabetes possess a greater risk of impairment to the neuronal system because high glucose levels exacerbate oxidative stress, accumulation of amyloid-beta peptides, and mitochondrial dysfunction, and impair cognitive functions and cause neurodegeneration conditions like Alzheimer's diseases. Due to the extensive focus on pharmacological intervention to prevent neuronal cells' impairment induced by hyperglycemia, the underlying molecular mechanism that links between Diabetes and Alzheimer's is still lacking. Given this, the present study aimed to evaluate the protective effect of piperine on streptozotocin (STZ) induced hyperglycemia and candidate gene expression. In the present study, rats were divided into four groups: control (Vehicle only), diabetic control (STZ only), piperine treated (20 mg/kg day, i.p), and sitagliptin (Positive control) treated. The memory function was assessed by Morris water maze and probe test. After treatment, biochemical parameters such as HOMA index and lipid profile were estimated in the serum, whereas histopathology was evaluated in pancreatic and brain tissue samples. Gene expression studies were done by real-time PCR technique. Present data indicated that piperine caused significant memory improvement as compared to diabetic (STZ) control. The assessment of HOMA indices in serum samples showed that piperine and sitagliptin (positive control, PC) caused significant alterations of insulin resistance, β cell function, and insulin sensitivity. Assessment of brain and pancreas histopathology shows significant improvement in tissue architecture in piperine and sitagliptin treated groups compared to diabetic control. The gene expression profile in brain tissue shows significantly reduced BACE1, PSEN1, APOA1, CASPASE3, and CATALASE genes in the piperine and sitagliptin (PC) treated groups compared to Diabetic (STZ) control. The present study demonstrated that piperine not only improves memory in diabetic rats but also reduces the expression of specific AD-related genes that can help design a novel strategy for therapeutic intervention at the molecular level.

Keywords: neuroprotection, gene expression, hyperglycemia, piperine, Alzheimer's



Article

In Vivo Studies of Inoculated Plants and In Vitro Studies Utilizing Methanolic Extracts of Endophytic *Streptomyces* sp. Strain DBT34 Obtained from *Mirabilis jalapa* L. Exhibit ROS-Scavenging and Other Bioactive Properties

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Abstract: Reactive oxygen species (ROS) and other free radicals cause oxidative damage in cells under biotic and abiotic stress. Endophytic microorganisms reside in the internal tissues of plants and contribute to the mitigation of such stresses by the production of antioxidant enzymes and compounds. We hypothesized that the endophytic actinobacterium *Streptomyces* sp. strain DBT34, which was previously demonstrated to have plant growth-promoting (PGP) and antimicrobial properties, may also have a role in protecting plants against several stresses through the production of antioxidants. The present study was designed to characterize catalase and superoxide dismutase (SOD), two enzymes involved in the detoxification of ROS, in methanolic extracts derived from six endophytic actinobacterial isolates obtained from the traditional medicinal plant *Mirabilis jalapa*. The results of a preliminary screen indicated that *Streptomyces* sp. strain DBT34 was the best overall strain and was therefore used in subsequent detailed analyses. A methanolic extract of DBT34 exhibited significant antioxidant potential in 1,1-diphenyl-2-picrylhydrazyl (DPPH) and 2,2'-azino-bis-3-ethylbenzthiazoline-6-sulphonic acid (ABTS) assays. The cytotoxicity of DBT34 against liver hepatocellular cells (HepG2) was also determined. Results indicated that methanolic extract of *Streptomyces* sp. strain DBT34 exhibited significant catalase and SOD-like activity with 158.21 U resulting in a 55.15% reduction in ROS. The IC₅₀ values of a crude methanolic extract of strain DBT34 on DPPH radical scavenging and ABTS radical cation decolorization were 41.5 µg/mL and 47.8 µg/mL, respectively. Volatile compounds (VOC) were also detected in the methanolic extract of *Streptomyces* sp. strain DBT34 using GC-MS analysis to correlate their presence with bioactive

Efficacy of Small Molecule Phytochemicals of Petroleum Ether Pod Extract of *Prosopis cineraria* (L.) Druce on HMG-CoA Reductase and Biomarker Indices of Lipoproteins: *In-vitro*, *In-vivo* and *In-silico* Study

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Abstract: The assigned goals of the study were examined to HMG-CoA reductase inhibition and antioxidants potential of the small molecule phytochemicals of petroleum ether pod extract of *Prosopis cineraria* (L.) Druce by *in-vitro*, *in-vivo*, and *in-silico* assessments. The phytochemical fingerprinting of the extract was done by LC-MS analysis, and compounds were identified using mass hunter software. *In-vitro* HMG-CoA reductase assay performed by sigma Aldrich kit. According, *in-vivo* investigations were conducted by using a hypercholesterolemic rabbit animal model. Further, *in-silico* analyses of molecular docking and ADMET were conducted by standard protocol. The leading identified compounds, i.e., prosogerin-A, luteolin, and gallic acid, were docked with the target enzyme of HMG-CoA reductase, which demonstrated significant binding energies up to -7.2 to 8.1(Kcal/mol). Subsequently, the ADMET predictions revealed druggability and ideal pharmacokinetics profile. Accordingly, the *in-vitro* HMG-CoA reductase inhibition assay was showed 53.1% inhibition capability of the test extract. The *in-vivo* investigation shown that the test extract caused significant reductions in the atherogenic index (log (Total cholesterol/triglyceride), Castelli risk index-I (CRI-I), and Castelli risk -II(CRI-II) along with lipid profile and antioxidants levels. It can be concluded that small-molecule phytochemicals such as Prosogerin A, Luteolin, Gallic acid are present in petroleum ether pod extract of *Prosopis cineraria* (L.) Druce possesses the capability to subside hypercholesterolemia and ameliorations in biomarker lipoproteins indices through HMG-CoA reductase inhibition and antioxidant potential.

Keywords: hypercholesterolemia; HMG-CoA reductase; lipoprotein indices; small molecule phytochemicals; lipoprotein indices; molecular docking.

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1. Introduction

The natural products can ameliorate several metabolic disorders by synchronizing several phytochemicals in this herbal extract. The scientific explanation regarding therapeutic efficacy is limited due to their solubility and bioavailability at target sites[1,2]. Accordingly, the different extracts of the same plant present variable efficacy due to the different solubility shown by various phytochemicals. The solubility of phytochemicals depends on the functional groups' polarity or availability, which indicates the reactivity of the compounds or groups of compounds (extracts)[3,4]. Accordingly, the traditional medicines and the Ayurvedic

Scopoletin: Antiamyloidogenic, Anticholinesterase, and Neuroprotective Potential of a Natural Compound Present in *Argyrea speciosa* Roots by In Vitro and In Silico Study

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ABSTRACT: Alzheimer's disease (AD) is characterized by depositions of amyloid β ($A\beta$) peptides aggregates resulting in plaques formation in the central nervous system (CNS). This study evaluates the disease-modifying potential of scopoletin against multiple factors associated with AD such as cholinesterase enzymes, $A\beta$ peptides, and neuroprotective properties against $A\beta$ - and H_2O_2 -induced cytotoxicity under in vitro conditions. Scopoletin was identified and quantified using UPLC-QTOF (ultra-high performance liquid chromatography-quadrupole time-of-flight) and high-performance liquid chromatography (HPLC), respectively. The antiamyloidogenic potential was evaluated by thioflavin T and congo red binding assay. Inhibition of key enzymes, that is, acetylcholinesterase and butyrylcholinesterase, was investigated by Ellman's assay. UPLC-QTOF analysis showed that most abundant phytoconstituent present in *Argyrea speciosa* hydroalcoholic root extract was scopoletin followed by festuclavine and ergometrine. Scopoletin was further quantified using novel reverse phase (RP)-HPLC method developed in this study. The neuroprotective potential of scopoletin was found to be 69% against $A\beta$ 42-induced neurotoxicity and 73% against H_2O_2 -induced cytotoxicity in PC12 cell culture at 40 μ M final concentration. At the same concentration, scopoletin inhibited $A\beta$ 42 fibril formation up to 57%. The IC_{50} concentration for AChE and BuChE enzyme inhibition by scopoletin was 5.34 and 9.11 μ M, respectively. The antiaggregation and enzyme inhibition results were complemented with strong molecular interactions of scopoletin with target proteins validated by in silico molecular docking analysis. Based on this study, it can be concluded that scopoletin can be used as a lead for amelioration of symptoms and disease-modifying effects in AD.

KEYWORDS: scopoletin, *Argyrea speciosa*, Alzheimer's disease, amyloid β , neuroprotection, antiamyloidogenic

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Introduction

Alzheimer's disease (AD), a progressive and irreversible neurodegenerative disorder, accounts for more than 80% cases of dementia in elderly people. Worldwide, 47 million patients estimated to be suffering from AD at present, and this number is expected to increase up to more than 130 million by 2050.¹ The present therapies are unlikely to mitigate AD, as they are focused on single specific drug target, that is, cholinesterase inhibitors. Alzheimer's disease is a complex multifactorial etiology, which includes depositions of amyloid β ($A\beta$) protein aggregates in the central nervous system (CNS).² These aggregates are formed by mis-cleavage of amyloid precursor protein (APP) that results in sticky insoluble peptide fragments called $A\beta$ fibrils, mostly consisting of oligomers that get deposited extracellularly on cerebrovascular space.³ Amyloid β fibrils are mainly of 2 types depending on the C-terminal cleavage pattern of APP. Amyloid β 40 is the most prevalent form but $A\beta$ 42 is more neurotoxic hydrophobic form of $A\beta$, as it has faster aggregation kinetics.⁴ Amyloid β 42 plaque formation causes neuronal cell damage and also increases oxidative stress in the CNS. As the AD progresses $A\beta$ fibrillation accelerates on binding to AChE.⁵ In the later stages of AD, there is

an established direct correlation between $A\beta$ aggregation and oxidative stress due to accumulation of reactive oxygen species (ROS).⁶ In addition, $A\beta$ fibrils have affinity to reduce redox-active metals and consequently lead to the formation of hydrogen peroxide and oxidized $A\beta$.⁷ Therefore, compounds that could inhibit cholinesterase, having antioxidant potential and prevent aggregation of $A\beta$ peptide could be used for therapeutic intervention. Current treatment only provides symptomatic relief. Presently, there is an urgent need to discover novel drug compounds that could have disease-modifying effects with negligible side effects. Considering this, the current study was undertaken to evaluate multitarget-directed ligand potential (MTDL) of natural compound scopoletin, an isolated coumarin class of compound, from *A. speciosa* roots.

A. speciosa or *vridhadaraka* meaning antiaging, has been mentioned in Ayurvedic material medica for its medicinal properties such as rheumatism, hepatoprotective, immunomodulatory, antioxidant, anti-inflammatory activity, and neurological disorders.^{8,9} The identified compound in this study, scopoletin (6-methoxy-7-hydroxycoumarin) is a phytoalexin, low molecular weight compounds that are biosynthesized in response to microbial attack over the plant. Scopoletin




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RESEARCH

Open Access



Phytoconstituents of an ethanolic pod extract of *Prosopis cineraria* triggers the inhibition of HMG-CoA reductase and the regression of atherosclerotic plaque in hypercholesterolemic rabbits

Heera Ram^{1*} , Noopur Jaipal¹, Jaykaran Charan², Priya Kashyap³, Suresh Kumar³, Rashmi Tripathi⁴, Bhim Pratap Singh⁵, Chandra Nayaka Siddaiah⁶, Abeer Hashem^{7,8}, Baby Tabassum⁹ and Elsayed Fathi Abd_Allah¹⁰

Abstract

Background: The HMG-CoA reductase is key enzyme of cholesterol biosynthesis which potentially contributes in management of hypercholesterolemia. The present study was designed to assess the inhibitory effect of phytoconstituents of an ethanolic extract of *Prosopis cineraria* pods on HMG – CoA reductase and regression potential of atherosclerotic plaque.

Methods: Healthy, adult male, albino rabbits in which hypercholesterolemia was induced by supplying the high fat diet and a supplement of cholesterol powder with coconut oil (500 mg/5 ml/Day/kg body weight) for 15 days, were used as a disease model. Phytochemical analysis of an ethanolic extract *Prosopis cineraria* pods was conducted using LCMS, GCMS and FTIR analysis. Further, in-vitro, in-vivo and *in-silico* assessments were performed.

Results: The in-vitro assessment of HMG –CoA reductase activity indicated a 67.1 and 97.3% inhibition by the extract and a standard drug (Pravastatin), respectively. Additionally, an *in-silico* evaluation was made using appropriate docking software and results also indicated as significant interactions of the identified compounds with the target enzyme. Treatment of rabbits with the ethanolic extract of *P. cineraria* pod resulted in significant ($P \leq 0.001$) reductions in total cholesterol, LDL cholesterol, VLDL cholesterol, and triglyceride. Accordingly, reductions were occurred in atherosclerotic plaque, intima and media of aortal wall along with lumen volume of the aorta significantly increased ($P \leq 0.001$).

Conclusion: It can be illustrating that the ethanolic extract of *Prosopis cineraria* pod contains potent bioactive phytocompounds might be inhibit HMG – CoA reductase and have regression potential of atherosclerotic plaque.

Keywords: HMG-CoA reductase, Hypercholesterolemia, Lipid profile, Antioxidants, *Prosopis cineraria*, Atherosclerosis

Introduction

Appropriate diets and dietary supplements have the potential for use in the management of various metabolic syndromes and their complications [1]. The fast food and/or junk food associated with many developed countries are having a drastic impact on the health of youth, as well as many adults with insufficient exercise. These types of food are typically rich in

free fatty acids and contain a large amount of fatty substances, all of which promote diabetes, hypercholesterolemia, cancer, and other metabolic syndromes [2]. In fact, three metabolic syndromes, cardiovascular diseases, diabetes, and cancer are the cause of up to 60–70% of mortality, worldwide [3]. Hypercholesterolemia is an independent risk factor that alone or together with the consumption of unhealthy foods can accelerate the development of atherosclerosis and further resulted in atherosclerotic plaque [4]. An increased generation of intracellular free radicals has also been demonstrated

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RESEARCH ARTICLE

Dual Inhibition of DPP-4 and Cholinesterase Enzymes by the Phytoconstituents of the Ethanolic Extract of *Prosopis cineraria* Pods: Therapeutic Implications for the Treatment of Diabetes-associated Neurological Impairments

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Abstract: Background: Insulin resistance causes decreased uptake of glucose which promotes the susceptibility of type 2 associated neurological impairments.

Methods: The study was aimed to evaluate the inhibition potential of the ethanolic extract of *Prosopis cineraria* (EPC) pods against DPP-4 and cholinesterase enzymes by *in-vitro*, *in-vivo* and *in-silico* assessments. The present study consists of *in vivo* studies on a diabetes-induced rat model by HOMA (Homeostasis model assessment) and related parameters, *in vitro* studies through the DPP-4 enzyme assay and cholinesterase assays using Ellman's reaction. The *in-silico* studies were conducted by the molecular docking of Cinerin C with targeted enzymes. The phytochemical characterization of the extract was demonstrated through LCMS studies. The antioxidant studies on the extract were performed by FRAP and TEAC assays.

Results: The extract showed 64.8% maximum inhibition of DPP-4, 34.91% inhibition of AChE and 74.35% inhibition of BuChE. The antioxidant capacity of the extract was observed to be $847.81 \pm 16.25 \mu\text{M Fe}^{2+}$ equivalent in the FRAP assay and 0.40 ± 0.08 mmol/l of Trolox equivalent in the TEAC assay. The *in vivo* study showed competent glycaemic control against significant HOMA IR (1.5), HOMA % β (26.5) and HOMA % S (68.8) as well as pancreatic cell mass proliferation. The *in-silico* analysis also revealed positive interactions of Cinerin C with targeted enzymes (DPP4 and cholinesterase).

Conclusion: It can be concluded that the phytoconstituents of *Prosopis cineraria* pod extract can be significantly considered in neuropharmacology to resolve insulin resistance-induced neurological complications as it showed inhibition against DPP-4, AChE and BuChE target enzymes.

Keywords: *Prosopis cineraria*, diabetes mellitus, Alzheimer's disease, DPP-4, acetylcholinesterase (AChE), butyrylcholinesterase (BuChE).

1. INTRODUCTION

The occurrence of diabetes mellitus (DM) and Alzheimer's disease (AD) is increasing worldwide [1]. Insulin resistance is considered as the main cause of type 2 diabetes mellitus (T2DM) which causes fluctuations in blood sugar levels and potential complications, such as neurodegenera-

tion and cognitive impairments [2]. The rise in blood sugar levels in diabetic patients can be controlled through the commercially available medications, however, complications can persist even after abnormal glucose levels are controlled, which makes effective treatment more challenging [3]. A recent study suggested that insulin desensitization in the brain may be one of the causes of neurodegeneration and numerous reports have identified T2DM as a potential causative factor for the neurodegeneration associated with AD [4]. Previous studies demonstrated that there was a strong asso-

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AMELIORATION IN INSULIN RESISTANCE AND β -CELL FUNCTION BY DPP-4 INHIBITION POTENTIAL OF *TRIGONELLA FOENUM* SEED EXTRACT IN TYPE-2 DIABETIC RATS

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ABSTRACT

The current study was aimed to evaluate amelioration in insulin resistance, β -cell function and pancreas protection by DPP-4 inhibition potential of *Trigonella foenum* (TF) seed extract in corticosteroid induced type-2 diabetic rats by *in silico*, *in vitro* and *in vivo* assays. The corticosteroid induced diabetic status of animal model was considered at the HOMA indices, insulin and glucose levels. The *in vitro* assay of DPP-4 inhibition showed up to 60.4 \pm 2.8% and activity of DPP-4 in serum was observed to be 39.12 \pm 1.3% in TF seed extract treated groups. Furthermore, the FTIR spectra interpreted availability of potent functional groups in possessing bioactive compounds. Additionally, HPLC studies confirmed that gallic acid is the leading compound present in TF seed extract and shows significant binding energy obtained from -3.6 to -3.7 with DPP-4 residues LYS-71, ASN-74, GLU-91, THR-94, PHE-95, ILE-102, ASN-103, and ASP-104 via hydrophobic bonds. Significant changes were observed in HOMA indices, histopathology and others supportive parameters in treated groups. The study revealed promising results against insulin resistance, β -cell function and protective alterations in pancreas.

Keywords: β -cell function, pancreas protection, HOMA, HbA1C, Insulin resistance, TF(TF).

INTRODUCTION

Dietary combinations are formulated from ancient times for therapeutics of various ailments in the Ayurveda, Unani, Chinese and other medical systems of old civilizations¹. Moreover, some potent drugs such as aspirin, metformin, anti-cancers drugs, digitalis and other leading drugs have been invented from herbal resources². All together less than 1% of higher plants have been pharmacologically evaluated and some of them are having antidiabetic potential³. The reported several plants have been used individually or in formulations for treatment of diabetes and its complications. But the major glitches with herbal formulations are the active constituents: not being well defined with their interactive interpretations⁴. Thus, it is absolutely necessary to recognize the active constituents and their molecular interactions which lead to therapeutic effectiveness of the product and correspondingly to standardize the product and explore to mode of action of plants using model systems¹. Plants have a peculiar plethora of potent bioactive phytochemicals, with a capacity to

resolve different metabolic disorders by following free radical scavenging activities and targeting key enzymes inhibitions⁵. In similar context, several studies concluded that most of the antidiabetic bioactive phytochemicals target in individual or multiple manner to key enzymes i.e. dipeptidyl-peptidase-4 (DPP-4), α -glucosidase, α -amylase, lipase, aldose reductase and protein tyrosine phosphatase 1B (PTP1B) and other key catabolic carbohydrate metabolism enzymes for therapeutics of diabetes^{6,7}. Recently, several studies have focussed on the inhibition of DPP-4 enzyme for therapeutics of diabetes, which is one of the serine based proteolytic enzyme cleave to GLP-1 and reduced internal insulin secretion⁸. Therefore, the DPP-4 inhibition considered as the main therapeutic target by synthetic and herbal DPP-4 inhibitors. *Trigonella foenum* (TF) seeds are one of oldest Indian food ingredients used in numerous food recipes used in folklore medicines for therapeutics of various ailments⁹. It is also reported that seed of TF possesses potent bioactive compounds such as alkaloids, polyphenols, saponins, flavonoids, steroids and others¹⁰. The current study was made to evaluate effect of DPP-4 inhibition potential of TF seed extract on insulin resistance, β -cell function and pancreas protection in corticosteroid induced type-2 diabetic rats.

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Anti-Aggregation Property of Allicin by *In Vitro* and Molecular Docking Studies

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ABSTRACT: Amyloidogenesis is the process in which amyloid beta (A β) peptide aggregation results in plaque formation in central nervous system (CNS) are associated with many neurological diseases such as Alzheimer's disease. The peptide aggregation initiated from peptide monomers results in formation of dimers, tetramers, fibrils, and protofibrils. The ability of allicin, a lipid-soluble volatile organosulfur biological compound, present in freshly crushed garlic (*Allium sativum* L.) to inhibit fibril formation by the A β peptide in vitro was investigated in the present study. Inhibition of fibrillogenesis was measured by a Thioflavin T (ThT) fluorescence assay and visualized by transmission electron microscopy (TEM). The molecular interaction between allicin and A β peptide was also demonstrated by in silico studies. The results show that allicin strongly inhibited A β fibrils by 97% at 300 μ M, compared with control (A β only) ($P < .001$). These results were further validated by visual of fibril formation by transmission microscopy and molecular interaction of amyloid peptide with allicin by molecular docking. A β forms favourable hydrophobic interaction with Ile32, Met35, Val36, and Val39, and oxygen of allicin forms hydrogen bond with the amino acid residue Lys28. Allicin anti-amyloidogenic property suggests that this naturally occurring compound may have potential to ameliorate and prevent Alzheimer's disease.

KEYWORDS: Alzheimer's disease, allicin, amyloid β , fibrillogenesis, transmission electron microscope, Thioflavin T fluorescence assay, molecular docking

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Introduction

The amyloid plaques deposited extracellularly in central nervous system (CNS) have been identified as one of the major pathological characteristics of Alzheimer's disease (AD).¹ The fundamental element of amyloid plaque revealed the presence of 1–40 and 1–42 amino acid sequences, termed the amyloid beta (A β) peptide. In brain, the disturbance between production and clearance of A β peptides formed by proteolytic cleavage of amyloid precursor protein (APP) directly correlated with the development of AD.^{2,3} The A β monomer is an unfolded, unstructured ~4kD peptide, rich in hydrophobic residues. It has been proposed that the smallest stable form of the A β peptide exists as a dimer, trimer, or a tetramer. Furthermore, A β fibrillogenesis is a process where A β monomers are more susceptible to self-aggregate and form oligomers and fibrils. Amyloid fibrils contain characteristic crossed β sheets which specifically bind to dyes such as Congo red and Thioflavin T (ThT) used in light microscopical staining and spectrophotometric/fluorescence techniques that are often used to analyse these fibrils.

The formation of well-ordered fibrillar aggregates consisting of A β plays a significant role in neurodegeneration and is considered one of the main pathogenic factors related to AD. Currently, there is no approved drug to target A β fibrillar assemblies. One possible strategy is the use of small molecules that efficiently and specifically inhibit the fibrillogenesis process. Previous studies have reported that some of the natural compounds such as polyphenols, curcumin, rosmarinic acid,

tannic acid, catechin, and quercetin inhibit the formation of fibrillar assembly in vitro.⁴ Present study evaluated the anti-amyloidogenic potential of allicin measured by ThT assay validated by transmission electron microscopy (TEM) and molecular docking studies.

Materials and Methods

Chemicals/reagents

Allicin ((R, S)-diallyl disulfide-S-oxide) was purchased from Caymen chemical, India. A β peptide (A β _{1–42}) was purchased from Abcam, India. Other chemicals such as cholesterol, uranyl acetate, glycine, sodium hydroxide, ThT were purchased from Sigma-Aldrich (India). All reagents were prepared in Milli-Q water (Millipore, India).

Thioflavin T fluorescence assay

ThT assay was used to quantify amyloid formation, in which the fluorescence intensity remarkably increases with the degree of β -sheet formation.⁵ ThT binds specifically to A β fibrils and this produces a shift in emission spectrum, the amount of β sheet formed being proportional to the fluorescent signal. A β was dissolved in Milli-Q water at a concentration of 11 μ M. A mixture of A β with or without allicin solution (37.5–300 μ M) was then incubated overnight at 37°C with constant rotation. After 24h, 80 μ L of ThT (10 μ M) in glycine-NaOH buffer (pH 9.0) was added to each well with 20 μ L of the A β with or without different concentrations of allicin in 96-well micro titration black





Synthetic and phytochemicals based dipeptidyl peptidase-IV (DPP-IV) inhibitors for therapeutics of diabetes

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ABSTRACT

Currently antidiabetic therapeutic strategies are mainly based on synthetic hypoglycemic agent. Antidiabetic drugs are associated with significant adverse effects of hypoglycemia, dysfunction of insulin and weight gain. Nowadays, the novel Dipeptidyl peptidase-IV (DPP-IV) inhibitors unique approach for the management of diabetes has been considered to be safe, as DPP-IV inhibitors reduce blood glucose level by monitoring hyperglycemia including positive effects on body weight as it remains neutral, improves glycated hemoglobin levels and do not induce hypoglycemia. Inhibitors help to protect degradation of Glucagon-like peptide-1 (GLP-1) and gastric inhibitory peptide (GIP), gut hormones which helps to suppresses postprandial glucagon release, delay gastric emptying and regulate satiety. Therefore, the innovation of DPP-IV inhibitor based drugs regulates activity of incretin hormones such as GLP-1 and GIP. Commercially available DPP-IV inhibitors are chemically synthesized with good therapeutic value. However, the durability and long-term safety of DPP-IV inhibitors remains to be established. On the other hand, phytochemicals-based DPP-IV inhibitors are alternative and safe to use as compared to synthetic. Numerous novel antidiabetic compounds and group of compounds emerging in clinical development are through DPP-IV inhibition. This review summarized recent progress made on DPP-IV inhibitors from both synthetic as well as from natural sources.

ARTICLE HISTORY

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KEYWORDS

Dipeptidyl peptidase-IV inhibitor; glucagon-like peptide-1; antidiabetic; phytochemicals

1. Introduction

Diabetes mellitus is a chronic and complicated metabolic disease caused by inherited or acquired deficiency in the production of insulin by the beta cells from pancreas, or as a result of the incompetence of the insulin. According to the International Diabetes Federation (IDF) and World Health Organization (WHO), diabetes is the World's fifth leading cause of death and around 415 million people of the world's population have diabetes mellitus in 2015 and by 2040, this will rise up to 642 million and every 6 s a person dies from diabetes [1]. Type 2 diabetes mellitus (T2DM) is the most common form of the disease, accounting for about 90 to 95% of all diagnosed cases of diabetes. As estimated and predicted by the

Research Article

Adverse Effects of Subchronic Dose of Aspirin on Reproductive Profile of Male Rats

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Aspirin (acetylsalicylic acid) is widely used for cardiovascular prophylaxis and as anti-inflammatory pharmaceutical. An investigation was carried out to evaluate the influence of subchronic dose of aspirin on reproductive profile of male rats, if any. Experimental animals were divided into three groups: control and aspirin subchronic dose of 12.5 mg/kg for 30 days and 60 days, respectively, while alterations in sperm dynamics, testicular histopathological and planimetric investigations, body and organs weights, lipid profiles, and hematology were performed as per aimed objectives. Subchronic dose of aspirin reduced sperm density, count, and mobility in cauda epididymis and testis; histopathology and developing primary spermatogonial cells (primary spermatogonia, secondary spermatogonia, and mature spermatocyte) count were also significantly decreased in rats. Hematological investigations revealed hemopoietic abnormalities in 60-day-treated animals along with dysfunctions in hepatic and renal functions. The findings of the present study revealed that administration with subchronic dose of aspirin to male rats resulted in altered reproductive profiles and serum biochemistry.

1. Introduction

Aspirin (acetylsalicylic acid) is a nonsteroidal anti-inflammatory drug (NSAID) used in various pathological conditions for its anti-inflammatory, antipyretic, and analgesic benefits [1, 2]. Investigations on aspirin and its underlying mechanism exposed new arena of knowledge, namely, prostaglandin synthesis and platelet inhibition and allowed additional development of efficient antiplatelet agents and anti-inflammatory medications [3]. In the present scenario, with increasing incidence of noncommunicable diseases, aspirin has gained a significant attention not only as an analgesic but also as a cardioprotective agent [4]. On the other hand, reports are there in the literature suggesting morbidity and mortality associated with adverse effects of aspirin. Furthermore, long-term therapeutic use of aspirin is associated with the incidences of gastrointestinal (GI) ulcerations, nephrotoxicity, hepatotoxicity, and even renal cell cancers [5]. The antiplatelet effect of aspirin has been attributed to coronary artery disease, pregnancy complications, and

preeclampsia in angiotensin-sensitive primigravida [5–7]. Whereas aspirin treatment causes an increased risk of cerebral microbleeds, tinnitus in children, and Reye's syndrome when given to children or adolescents to treat fever or illnesses, it alters estrogen and progesterone biosynthesis upon chronic administration [8–10].

Interestingly, aspirin-induced inhibition of prostaglandins synthesis resulted in altered cholesterol metabolism and androgen biosynthesis [10]. However, effect of subchronic aspirin administration on male reproductive profile was not well elucidated till date. Therefore, the present study was designed to reveal out the influence of aspirin subchronic dose on male reproductive profile and serum variables of rats.

2. Materials and Methods

2.1. Experimental Animals. Colony bred adult healthy male albino rats weighing 200–235 g were used for present research. All animals were proven fertile and were obtained from the Indian Veterinary Research Institute (IVRI),

Research Article

Antiatherosclerotic and Cardioprotective Potential of *Acacia senegal* Seeds in Diet-Induced Atherosclerosis in Rabbits

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Acacia senegal L. (Fabaceae) seeds are essential ingredient of “Pachkutta,” a specific Rajasthani traditional food. The present study explored antiatherosclerotic and cardioprotective potential of *Acacia senegal* seed extract, if any, in hypercholesterolemic diet-induced atherosclerosis in rabbits. Atherosclerosis in rabbits was induced by feeding normal diet supplemented with oral administration of cholesterol (500 mg/kg body weight/day mixed with coconut oil) for 15 days. Circulating total cholesterol (TC), HDL-cholesterol (HDL-C), LDL-cholesterol (LDL-C), triglycerides, and VLDL-cholesterol (VLDL-C) levels; atherogenic index (AI); cardiac lipid peroxidation (LPO); planimetric studies of aortal wall; and histopathological studies of heart, aorta, kidney, and liver were performed. Apart from reduced atherosclerotic plaques in aorta (6.34 ± 0.72) and increased lumen volume (51.65 ± 3.66), administration with ethanolic extract of *Acacia senegal* seeds (500 mg/kg/day, p.o.) for 45 days to atherosclerotic rabbits significantly lowered serum TC, LDL-C, triglyceride, and VLDL-C levels and atherogenic index as compared to control. Atherogenic diet-induced cardiac LPO and histopathological abnormalities in aorta wall, heart, kidney, and liver were reverted to normalcy by *Acacia senegal* seed extract administration. The findings of the present study reveal that *Acacia senegal* seed extract ameliorated diet-induced atherosclerosis and could be considered as lead in the development of novel therapeutics.

1. Introduction

Atherosclerosis is a chronic disease characterized by lipid deposition and inflammation in arterial wall [1]. Accumulation of oxidized cholesterol through a cascade of gradual developing processes results in an unstable atherosclerotic plaque that ultimately bursts and gives rise to myocardial infarction [1, 2]. Atherosclerosis is mainly influenced by hypercholesterolemia and dyslipidemia that are developed through various risk factors, that is, hereditary, sedentary lifestyle, diabetes, and high fat diet consumption [1, 3, 4]. A number of pharmacological agents are available in the market to manage dyslipidemia and atherosclerosis; however the drugs are reported to induce adverse drug reactions [5–7]. Interestingly, herbal nutritional supplement has a potential to ameliorate cardiovascular diseases at different steps in their development without any known side effect [5, 7, 8].

The resident population of Western Rajasthan consumes a specific kind of long-established food known as “Pachkutta”

and its main components are *Acacia senegal* L. (Fabaceae) seeds, pod of *Prosopis cineraria* L. (Fabaceae), and *Capparis decidua* L. (Capparaceae) fruit. In general, Rajasthani people who incorporate “Pachkutta” and some long-established foods in their diet are found to report almost nil incidences of cardiovascular system related diseases. *Acacia senegal*, commonly known as Gum Arabica, Kumath, and Rfaudraksha, is a drought or arid region tree. Official parts of *Acacia senegal* such as seeds, fruits, leaves, gum, and bark are rich in polyphenols, flavonoids, tannins, saponins, and alkaloids [9, 10]. While *Acacia senegal* gum is used for soothing mucous membranes of the intestine and to treat inflamed skin [11], it is also reported to cure bleeding, bronchitis, malaria, diarrhea, gonorrhea, leprosy, typhoid fever, and upper respiratory tract infections besides possessing antiplatelet and antifertility activities [12–14].

The present study was planned to investigate antiatherosclerotic and cardioprotective role of *Acacia senegal* seed extract, if any, using high fat diet-induced atherosclerotic

**LEGUMES
Admin Order**

No. BT/PR28594/NER/95/1496/2018

GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY
(NER-BPMC)

Block 2, 6-8th Floors
CGO Complex, Lodhi Road,
New Delhi- 110 003
Dated:09 /03 /2022

ORDER

Sanction of the President is hereby accorded, under Rule 18 of the Delegation of Financial Powers Rules ,1978 , for the implementation of the project entitled: **"Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers"** for a period of 3 Year 0 Month at a total cost of Rs. **31522320/-** (Rupees Three Crores Fifteen Lakhs Twenty Two Thousand Three Hundred and Twenty Only) on the terms and conditions detailed here under:-

2 The Project :

2.1 Title : "Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers"

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2.3 Objectives:

Overall Objectives:

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains, and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains and development of plant growth promoting (PGP) formulations for both legume crops and non-legume crops including rice and maize.
3. To understand the mechanisms of specificity of broad-range symbiont system by unraveling signal transduction through NGS, metabolomics, transcriptomics, and small RNAs/peptides approaches.

Institute wise Objectives:

Assam (Central) University, Silchar

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains in the selected sites of Cachar district of Assam; and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.

Vaishali

2. Screening of efficient N fixing promiscuous Assam -RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes.
3. Screening of native Assam-RNB strains for their plant growth promoting (PGP) activities with additional non-legume crops including rice and maize. Antagonistic studies to ensure that new bioformulations developed are not affected by existing formulations used in NER and vice versa.
4. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

CSIR-National Botanical Research Institute

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains, and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. To study cross infectivity of strains isolated from wild/underutilized legumes on legume crops for improved productivity
3. Screening of native NER-RNB for development of plant growth promoting (PGP) formulations and associated antagonistic studies.
4. To understand the mechanisms of specificity of broad-range symbiont system by unraveling signal transduction through NGS, metabolomics, transcriptomics, and small RNAs/peptides approaches.

Jai Narain Vyas University

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains, and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes in glass house.
3. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

Institute of Bioresources and Sustainable Dvelopment

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains in the selected sites of Manipur; and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes.
3. Screening of native NER-RNB strains for their plant growth promoting (PGP) activities with additional non-legume crops including rice and maize. Antagonistic studies to ensure that new bioformulations developed are not affected by existing formulations used in NER and vice versa.

Vaishali

4. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

North Eastern Regional Institute of Science And Technology

1. Exploration of native/underutilized legumes in various sites of Arunachal Pradesh and isolation, purification and phenotypic characterization of NER-root nodule bacteria (RNB) strains from selected legumes.

North-Eastern Hill University, Shillong

1. Exploration of native/underutilized legumes of NER for diversity of root nodule bacterial (RNB) strains in the selected sites of Meghalaya; and their molecular characterization. Existing microbial formulations developed for NER would be used as the baseline materials and will be further characterized.
2. Screening of efficient N fixing promiscuous NER-RNB strains: Biological-assay and cross-inoculation experiments in glass house for determining their host range based on analysis of symbiotic genes. And study of host specificity of few beneficial microbes associated with underutilized legumes.
3. Screening of native NER-RNB strains for their plant growth promoting (PGP) activities with additional non-legume crops including rice and maize. Antagonistic studies to ensure that new bioformulations developed are not affected by existing formulations used in NER and vice versa.
4. NGS and comparative genomic analysis of selected RNB strains for better understanding of molecular basis of symbiotic interactions between rhizobia and host legume.

Tripura University

1. Exploration of native/underutilized legumes in various sites of Tripura and isolation, purification and phenotypic characterization of NER-root nodule bacteria (RNB) strains from selected legumes.

2.4 Time Schedule:

The duration of the project is 3 Year 0 Month from the date of this sanction order.

Vaisali

डॉ. वैशाली पंजाली / Dr. VAISHALI PANJABI
वैज्ञानिक 'ई' / Scientist 'E'
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विज्ञान और प्रौद्योगिकी विभाग / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

2.5 Project Cost:

The total cost of the project is Rs. **31522320/-** (Rupees Three Crores Fifteen Lakhs Twenty Two Thousand Three Hundred and Twenty Only) as per details given below :

Institute	Year I	Year II	Year III	Total Cost(Rs.)
1. Assam (Central) University, Silchar	2128520	1628520	1732200	5489240
2. CSIR-National Botanical Research Institute	1396000	1396000	1479520	4271520
3. Institute of Bioresources and Sustainable Development	1503520	1503520	1607200	4614240
4. Jai Narain Vyas University	1563040	1563040	1674400	4800480
5. North Eastern Regional Institute of Science And Technology	1203520	1203520	1307200	3714240
6. North-Eastern Hill University, Shillong	2288040	1788040	1899400	5975480
7. Tripura University	1001760	801760	853600	2657120
Total (Rs.)	11084400	9884400	10553520	31522320

Institute wise details are:

Budget Head	Year I	Year II	Year III	Total(Rs.)
1. North-Eastern Hill University, Shillong				
Equipment	500000.00			500000.00
Manpower	863040.00	863040.00	974400.00	2700480.00
Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	475000.00	475000.00	475000.00	1425000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Hiring/analytical charges	150000.00	150000.00	150000.00	450000.00
Training/Workshop	100000.00	100000.00	100000.00	300000.00
Total (Rs.)	2288040.00	1788040.00	1899400.00	5975480.00
2. Assam (Central) University, Silchar				
Equipment	500000.00			500000.00
Manpower	803520.00	803520.00	907200.00	2514240.00

Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	475000.00	475000.00	475000.00	1425000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Hiring/analytical charges	150000.00	150000.00	150000.00	450000.00
Total (Rs.)	2128520.00	1628520.00	1732200.00	5489240.00
3. Jai Narain Vyas University				
Manpower	863040.00	863040.00	974400.00	2700480.00
Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	400000.00	400000.00	400000.00	1200000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Hiring analytical Service	100000.00	100000.00	100000.00	300000.00
Total (Rs.)	1563040.00	1563040.00	1674400.00	4800480.00
4. Institute of Bioresources and Sustainable Dvelopment				
Manpower	803520.00	803520.00	907200.00	2514240.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	400000.00	400000.00	400000.00	1200000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Sequencing of Cultures	150000.00	150000.00	150000.00	450000.00
Total (Rs.)	1503520.00	1503520.00	1607200.00	4614240.00
5. CSIR-National Botanical Research Institute				
Manpower	696000.00	696000.00	779520.00	2171520.00
Overhead	100000.00	100000.00	100000.00	300000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	400000.00	400000.00	400000.00	1200000.00
Contingency	100000.00	100000.00	100000.00	300000.00
Total (Rs.)	1396000.00	1396000.00	1479520.00	4271520.00
6. North Eastern Regional Institute of Science And Technology				
Manpower	803520.00	803520.00	907200.00	2514240.00
Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	200000.00	200000.00	200000.00	600000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1203520.00	1203520.00	1307200.00	3714240.00
7. Tripura University				
Equipment	200000.00			200000.00
Manpower	401760.00	401760.00	453600.00	1257120.00

Vaishali

Overhead	50000.00	50000.00	50000.00	150000.00
Travel	100000.00	100000.00	100000.00	300000.00
Consumables	200000.00	200000.00	200000.00	600000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1001760.00	801760.00	853600.00	2657120.00

2.6 Equipment:

The details of the equipment sanctioned for the implementation of the project at **Annexure-I**

2.7 Manpower:

The details of the manpower sanctioned for the implementation of the project at **Annexure-II**

3. Head of Account:

The **Non-Recurring** expenditure involved is debitable to:

Demand No. 89	Department of Biotechnology
3425	Other Scientific Research 2021-2022
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance to Research and Development
3425.60.200.29.17.35	Grants for creation of capital assets

The **Recurring** expenditure involved is debitable to:

Demand No. 89	Department of Biotechnology
3425	Other Scientific Research 2021-2022
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance to Research and Development
3425.60.200.29.17.31	Grants -in-Aid General

4. Terms & Conditions:

- The Non-Recurring items must be procured and installed within 18-months of the sanction of the project, failing which the PIs have to return the remaining/unutilized Non Recurring grant with 10% of Interest.
- In case the amount of grant-in-aid is refunded, the whole or a part amount of the grant, with an interest at 10% per annum there on shall be recovered.

4.1 The other terms and conditions governing this sanction are attached at Annexure-III.

Vaishali

- 4.2A** Memorandum of Agreement (MoA) will be signed between the Department of Biotechnology and the grantee institution on Non-Judicial stamp paper Rs. 100/- in the enclosed format and the second release/installment will be made only after signing of MoA between the grantee institutions and DBT. In case of NGO's and Private Institution's, execution of MOA is mandatory before first release. A format of the MoA is enclosed in Annexure-IV
- 4.3** The Institute/Agency will keep the whole of the grant in a Bank Account earning interest, and the interest so earned should be reported to DBT in the Utilisation Certificate and Statement of Expenditure. The interest earned should be remitted to the Consolidated fund of India through Bharat Kosh portal(www.bharatkosh.gov.in) as per GFR-2017-230(8) after finalization of the account for a given Financial Year.
- 5.** No International Travel will be undertaken from the sanctioned project grant unless specified otherwise.
- 6.** The Director , North Eastern Regional Institute of Science And Technology, Itanagar, Arunachal Pradesh and The DIRECTOR, CSIR-National Botanical Research Institute, Lucknow, Uttar Pradesh and The Director, Institute of Bioresources and Sustainable Dvelopment, Imphal, Manipur and The Registrar, Assam (Central) University, Silchar, Silchar, Assam and The Registrar, Jai Narain Vyas University, Jodhpur, Rajasthan and The Registrar, North-Eastern Hill University, Shillong, Shillong, Meghalaya and The Registrar, Tripura University, Agartala, Tripura would be responsible for submission of Statements of Expenditure (SoE), utilization certificates (UC), Assets Certificates, Manpower staffing & expenditure details in prescribed DBT formats to DBT in respect of grants released in this project from time to time.
- 7.** PI's of DBT sponsored projects can consider appointment of JRF from Category-II merit list of DBT-BET exam so that candidates can be paid fellowships at par with NET/GATE/BET qualified candidates as per DST OM No. A.SR/S9/Z-05/2019 dated on 30 Jan 2019. However, there is no compulsion on PI's to select candidates for JRF in their projects from Category-II of DBT-BET.
- 8.** As per Rule 236 (1) of GFR 2017, the accounts of all Grantee Institutions or Organisations shall be open to inspection by the sanctioning authority and audit, both by the Comptroller and Auditor General of India under the provision of CAG(DPC) Act 1971 and internal audit by the Principal Accounts Office of the Ministry or Department, whenever the Institution or Organisation is called upon to do so.
- 9.** If the Research Project involves biological resources, the obligations under the Biological Diversity Act 2002 as applicable shall be complied with by the Project Investigator, the details of such obligations can be accessed at www.nbaindia.org
- 10.(I)** "The PIs/Implementing Agencies shall strictly adhere to the GoI instructions issued vide OM No.F.4.1.2021-PPD dated 30.6.2021 in the matter of issue of Global tender Enquiry with special reference to instructions contained under para 4 of the said OM for procurement of equipments, spares and consumables for research purposes and shall not issue Global Tenders Enquiries before seeking the approval of the competent authority".
- (II)** "After incurring the expenditure on import of such items and at the time of submission of UCs to the department next year, the PIs will also furnish the copy of the approval sought from the competent authority for issue of the GTE for such items of import. The release of next installment of grant will be subject to the fulfillment of the above condition."

Vaishali

डॉ. वैशाली पंजाबी / Dr. VAISHALI PANJABI
वैज्ञानिक 'ई' / Scientist 'E'
बायोटेक्नोलॉजी विभाग / Deptt. of Biotechnology
विज्ञान और प्रौद्योगिकी, संकलन / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

- 11.If any biological data as specified in the guidelines are being generated in the project then PI should submit the data generated in the project to Indian Biological Data Centre – The National Repository being implemented at Regional Centre for Biotechnology, Faridabad in compliance with the Biotech-PRIDE Guidelines 2021.
- 12.This issues under the power delegated to this Department and with the concurrence of IFD vide their SAN No.102/IFD/SAN/3134/2021-2022 dated **March, 09 2022.**
- 13.This sanction order has been noted at serial no. 172-173 in the Register of Grants.

Vaishali

(Dr. Vaishali Panjabi)
Scientist 'E'

डॉ. वैशाली पंजाबी / Dr. VAISHALI PANJABI
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विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

To,
The Pay & Accounts Officer,
Department of Biotechnology,
New Delhi – 110 003.

Copy to:

- 1 The Principal Director of Audit (Scientific Departments), DACR Building, New Delhi- 110 002.
- 2 Prof. S.K. Barik(Project Co-ordinator), National Botanical Research Institute, Lucknow - 226001, India
- 3 The Director , North Eastern Regional Institute of Science And Technology, NIRJULI, Itanagar - 791109, Arunachal Pradesh
- 4 The Director, CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow-226001, Uttar Pradesh
- 5 The Director, Institute of Bioresources and Sustainable Development, Takyelpat, Imphal - 795001, Manipur
- 6 The Registrar, Assam (Central) University, Silchar, DARGAKONAH, Silchar - 788011, Assam
- 7 The Registrar, Jai Narain Vyas University, Mohanpura Overbridge, Ratanada, Jodhpur - 342003, Rajasthan
- 8 The Registrar, North-Eastern Hill University, Shillong, NEHU Permanent Campus, Shillong - 793022, Meghalaya
- 9 The Registrar, Tripura University, Suryamaninagar, Agartala - 799022, Tripura
- 10 Dr. Debjyoti Bhattacharyya, Assistant Professor, Department of Life Science & Bioinformatics, Assam (Central) University, Silchar - 788011, Assam
- 11 Dr. Nisha Tak, Assistant Professor, Department of Botany, Faculty of Science, Jai Narain Vyas University New Campus, Pali Road, Jodhpur - 342001, Rajasthan
- 12 Dr. Padmaraj Gajurel, Associate Professor, North Eastern Regional Institute of Science & Technology (NERIST), (Demeed University), Nirjuli- 791109, Arunachal Pradesh
- 13 Dr. Panna Das, Assistant Professor, Department of Botany, Tripura University, Suryamaninagar, Tripura - 799022, Tripura
- 14 Dr. Poonam C Singh, Senior Scientist, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
- 15 Dr. Prabodh Kumar Trivedi, Senior Principal Scientist, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
- 16 Dr. Puneet Singh Chauhan, Senior Scientist, Microbial Technologies, CSIR-

- National Botanical Research Institute, ana Pratap Marg, Lucknow - 226001, Uttar Pradesh
- 17 Dr. Sanjeev Kumar, Associate Professor, Dept of Life Science & Bioinformatics, Assam (Central) University, Silchar - 788011, Assam
 - 18 Dr. Sarangthem Indira Devi, Scientist D, Microbial Biotechnology, Microbial Resources Division, Institute of Bioresources and Sustainable Development (IBSD), , Takyelpat, Imphal-795001, Manipur
 - 19 Dr. Satya Narayan Jena, Principal Scientist, Plant Molecular Genetics, CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow - 226001, Uttar Pradesh
 - 20 Dr. Shweta Jha, Assistant Professor, Department of Botany, Faculty of Science, Jai Narain Vyas University, New Campus, Pali Road, Jodhpur - 342001, Rajasthan
 - 21 Dr. Sorokhaibam Sureshkumar Singh, Associate Professor, Department of Forestry, North Eastern Regional Institute of Science & Technology (NERIST), (Demeed University), Nirjuli-791109, Arunachal Pradesh
 - 22 Dr. Suchi Srivastava, Senior Scientist, Plant Microbe Interaction Division, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
 - 23 Dr. Sunil S Thorat, Scientist-D, Bioresources Database Unit, Institute of Bioresources and Sustainable Development, IBSD, Imphal - 795001, Manipur
 - 24 Prof. Hukam S Gehlot, Professor, Department of Botany, Jai Narain Vyas University, New Campus, Pali Road, Jodhpur, odhpur - 342001, Rajasthan
 - 25 Prof. Piyush Pandey, Professor, Department of Microbiology, Assam (Central) University, - 788011, Assam
 - 26 Prof. Santa R Joshi, Professor, Department of Biotechnology & Bioinformatics, North-Eastern Hill University, Shillong, - 793022, Meghalaya
 - 27 Prof. Saroj K Barik, Director, CSIR-NBRI, CSIR-National Botanical Research Institute, Lucknow - 226001, Uttar Pradesh
 - 28 Cash Section, DBT (2 copies).
 - 29 Sanction Folder.
 - 30 File Copy.

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(Dr. Vaishali Panjabi)
Scientist 'E'

डॉ. वैशाली पंजाबी / Dr. VAISHALI PANJABI
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विज्ञान और प्रौद्योगिकी मंत्रालय / Min. Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

Annexure -I

Details of the Equipment sanctioned for the implementation of the project entitled "**Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers**":

North-Eastern Hill University, Shillong			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Deep Freezer (-80°C) 500L	1	500000.00
Total			500000.00
Assam (Central) University, Silchar			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Gel-Doc EZ System	1	500000.00
Total			500000.00
Tripura University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Incubator	1	200000.00
Total			200000.00



(Dr. Vaishali Panjabi)
Scientist 'E'

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विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

Annexure -II

Details of the manpower sanctioned for the implementation of the project entitled **"Exploration of native legumes and characterization of associated nitrogen fixing microsymbionts in North-Eastern India for development of biofertilizers"**:

Head	No. of Position	Year I	Year II	Year III	Total (Rs.)
1. Assam (Central) University, Silchar					
Project Associate Project Associate I/II Rs. 35000/-+ 8% HRA	2	0	0	907200	907200
Project Associate Project Associate I/II Rs. 31000/-+ 8% HRA	2	803520	803520	0	1607040
Total(Rs.)		803520	803520	907200	2514240
2. CSIR-National Botanical Research Institute					
Project Associate Project Associate I/II Rs. 25000/-+16% HRA	2	696000	696000	0	1392000
Project Associate Project Associate I/II Rs. 28000/-+16% HRA	2	0	0	779520	779520
Total(Rs.)		696000	696000	779520	2171520
3. Institute of Bioresources and Sustainable Dvelopment					
Project Associate Project Associate I/II Rs. 31000/-+ 8% HRA	2	803520	803520	0	1607040
Project Associate Project Associate I/II Rs. 35000/-+ 8% HRA	2	0	0	907200	907200
Total(Rs.)		803520	803520	907200	2514240
4. Jai Narain Vyas University					
Project Associate Project Associate I/II Rs. 31000/-+16% HRA	2	863040	863040	0	1726080
Project Associate Project Associate I/II Rs. 35000/-+16% HRA	2	0	0	974400	974400
Total(Rs.)		863040	863040	974400	2700480
5. North Eastern Regional Institute of Science And Technology					
Project Associate Project Associate I/II Rs.31000/-+ 8% HRA	2	803520	803520	0	1607040
Project Associate Project Associate	2	0	0	907200	907200

Vaishali

I/II Rs.35000/-+ 8% HRA					
Total(Rs.)		803520	803520	907200	2514240
6. North-Eastern Hill University, Shillong					
Project Associate Project Associate I/II Rs. 31000/- +16% HRA	2	863040	863040	0	1726080
Project Associate Project Associate I/II Rs. 35000/- +16% HRA	2	0	0	974400	974400
Total(Rs.)		863040	863040	974400	2700480
7. Tripura University					
Project Associate Project Associate I/II Rs.31000/-+ 8% HRA	1	401760	401760	0	803520
Project Associate Project Associate I/II Rs.35000/-+ 8% HRA	1	0	0	453600	453600
Total(Rs.)		401760	401760	453600	1257120

Emoluments detail of research personal(s) mentioned in table(s) of Annexure-II shall be applicable only if candidate(s) met educational qualification and eligibility criteria as per DST OM No. SR/S9/Z-05/2019 dated 10.07.2020.

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(Dr. Vaishali Panjabi)
Scientist 'E'

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विज्ञान और प्रौद्योगिकी मंत्रालय / M/o Science & Tech.
भारत सरकार, नई दिल्ली / Govt. of India, N. Delhi

No. BT/PR24584/NER/95/762/2017
GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Appl. No.: Agri/2017/08

Block 2, 6-8th Floors
CGO Complex, Lodhi Road,
New Delhi- 110 003
Dated: 06/06/2018

ORDER

Sanction of the President is hereby accorded, under Rule 18 of the Delegation of Financial Powers Rules, 1978, for the implementation of the project entitled: **"Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range"** for a period of 3 Year 0 Month at a total cost of Rs. 10526988 (Rupees One Crores Five Lakhs Twenty Six Thousand Nine Hundred and Eighty Eight Only) on the terms and conditions detailed here under:-

2 The Project :

2.1 Title : **"Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range"**

2.2 Details of the Investigators:

Project Coordinator

Prof. Chitta Ranjan Deb

Professor

Department of Botany

Nagaland University

Department of Botany,

Nagaland University, Headquarters: Lumami 798627, Zunheboto,
Nagaland, 798627

Principal Investigators:

M. Asha

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COUNTER SIGNED

Prima
(PE)

Prima

M
REGISTRAR
Jal Narain Vyas University
JODHPUR (Raj.)

Prof. Chitta Ranjan Deb
Professor
Department of Botany
Nagaland University
Department of Botany,
Nagaland University, Headquarters:
Lumami 798627,
Zunheboto, Nagaland, 798627

Prof. Hukam Singh Gehlot
Professor
Botany
Jai Narain Vyas University
Department of Botany, Faculty of
Science, New Campus, Pali Road,
J.N.Vyas University, Jodhpur PIN:
342001, Jodhpur, Rajasthan,
342001

Prof. Satyawada Rama Rao
Professor
Department of Biotechnology and
Bioinformatics
North-Eastern Hill University
Department of Biotechnology &
Bioinformatics,
North-Eastern Hill University,
Shillong 793022,
Shillong, Meghalaya, 793022

CO-PI:

Dr. Asosii Paul
Assistant Professor
Botany
Nagaland University
Department of Botany, Nagaland University,
Lumami-798627, Zunheboto - 798627,
Nagaland

Dr. Nisha Tak
Assistant Professor
Botany
Jai Narain Vyas University
Department of Botany, Faculty of Science, New
Campus, Pali Road, J.N.Vyas University,
Jodhpur, Jodhpur - 342001, Rajasthan

Ned. Ash

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REGISTRAR
Jai Narain Vyas University
JODHPUR (Raj.)

[Signature]
(PE)

[Signature]

2.3 Objectives:

Overall Objectives:

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains.
3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories

Institute wise Objectives:

Jai Narain Vyas University

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy.
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains.
3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories.

Nagaland University

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy.
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains

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REGISTRAR
Jai Narain Vyas University
JODHPUR (RAJ.)

3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories

North-Eastern Hill University

1. Survey of legumes in the selected sites of Nagaland; Herbarium sheets preparation their digitalization; Collection and storage of germplasm; recording of nodule types and study of nodule anatomy.
2. Isolation, purification, phenotypic characterization of Nagaland-RNB strains and assessment of their genetic diversity based on RAPD profiles; Identification and molecular phylogeny based on 16S rRNA and recA gene sequences of N fixing Nagaland-RNB strains.
3. Symbiotic characterization and phylogeny based on nodA/nodC and nifH gene sequences to identify major symbiotic groups of Nagaland-RNB strains.
4. Bio-assay work: To perform authentication and cross-inoculation experiments of Nagaland-RNB strains in glass house for determining their host range. To study nitrogen fixing efficiency using ARA (As recommended by Expert Committee assay to be carried out at NEHU, Shillong).
5. Multi locus sequence analysis studies using protein-coding housekeeping genes (glnII, dnaK, rpoB, gyrB, atpD) of selected Nagaland-RNB strains (screened on the basis of novelty in recA and 16S rRNA gene phylogeny). To perform concatenated phylogenetic analysis based on housekeeping and symbiotic genes.
6. Development of consortium using identified and well characterized efficient nitrogen fixing rhizobial strains having broad host range. Deposition of promiscuous and novel RNB strains at the national microbial depositories.

2.4 Time Schedule:

The duration of the project is 3 Year 0 Month from the date of this sanction order.

2.5 Project Cost:

The total cost of the project is Rs. 10526988/- (Rupees One Crores Five Lakhs Twenty Six Thousand Nine Hundred and Eighty Eight Only) as per details given below :

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Jal Bahadur Vyas University
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Institute	Year I	Year II	Year III	Total Cost(Rs.)
1. Jai Narain Vyas University	1908000	910000	902996	3720996
2. Nagaland University	1782000	880000	869996	3531996
3. North-Eastern Hill University	1461000	910000	902996	3273996
Total (Rs.)	5151000	2700000	2675988	10526988

Institute wise details are:

Budget Head	Year I	Year II	Year III	Total(Rs.)
1. Jai Narain Vyas University				
Equipment	998000.00			998000.00
Manpower	360000.00	360000.00	402996.00	1122996.00
Travel	50000.00	50000.00	50000.00	150000.00
Overhead	100000.00	100000.00	100000.00	300000.00
Consumables	350000.00	350000.00	300000.00	1000000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1908000.00	910000.00	902996.00	3720996.00
2. Nagaland University				
Equipment	902000.00			902000.00
Manpower	330000.00	330000.00	369996.00	1029996.00
Overhead	100000.00	100000.00	100000.00	300000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Travel	50000.00	50000.00	50000.00	150000.00
Consumables	350000.00	350000.00	300000.00	1000000.00
Total (Rs.)	1782000.00	880000.00	869996.00	3531996.00
3. North-Eastern Hill University				
Equipment	551000.00			551000.00
Manpower	360000.00	360000.00	402996.00	1122996.00
Consumables	350000.00	350000.00	300000.00	1000000.00

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Travel	50000.00	50000.00	50000.00	150000.00
Overhead	100000.00	100000.00	100000.00	300000.00
Contingency	50000.00	50000.00	50000.00	150000.00
Total (Rs.)	1461000.00	910000.00	902996.00	3273996.00

2.6 Equipment:

The details of the equipment sanctioned for the Implementation of the project at
Annexure-I

2.7 Manpower:

The details of the manpower sanctioned for the Implementation of the project at
Annexure-II

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Dr. Nareln Vyas University
JODHPUR (Raj.)

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3. Head of Account:

The **Non-Recurring** expenditure involved is debitable to:

Demand No. 85	Department of Biotechnology
3425	Other Scientific Research 2018-2019
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance for Research and Development
3425.60.200.29.17.35	Grants for creation of capital assets

The **Recurring** expenditure involved is debitable to:

Demand No. 85	Department of Biotechnology
3425	Other Scientific Research 2018-2019
3425.60	Others (Sub Major Head)
3425.60.200	Assistance to other Scientific Bodies (Minor Head)
3425.60.200.29	Biotechnology Research and Development
3425.60.200.29.17	Assistance for Research and Development
3425.60.200.29.17.31	Grants-In-Aid General

4. Terms & Conditions:

Additional Terms and Conditions specific for Twinning R and D program for NER:

- Both NER and Rest of India RoI Institutions scientists should work together for the objectives stated in the sanction of the project and any deviation from this would attract closure of the project at any point of time.
- In the project review meetings, both the PIs from NER and RoI Institutions should participate and make presentation.
- The outcomes of the project such as research papers, patents, copy rights etc. should be made jointly.
- The NER Scientists are to be trained at the collaborating institute appropriately to empower the NER Scientists.
- The project personal such as Research Associate, JRF or SRF, Research Assistant are also to be trained at least once in the collaborating national institute.
- The collaborating institute scientist should visit NER Institutions more frequently to guide NER scientists in design and conduct of experiments.

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Jawahar Vyas University
JODHPUR (Raj.)

- 4.1 The other terms and conditions governing this sanction are attached at Annexure- III.
- 4.2A Memorandum of Agreement (MoA) will be signed between the Department of Biotechnology and the grantee institution on Non-Judicial stamp paper Rs. 100/- in the enclosed format and the second release/installment will be made only after signing of MoA by the grantee institutions and its acceptance by DBT. In case of NGO or Private Institution, MOA signed is mandatory first release. A format of the MoA is enclosed in Annexure-IV
- 4.3The Institute/Agency will keep the whole of the grant in a Bank Account earning Interest, and the interest so earned should be reported to DBT in the Utilisation Certificate and Statement of Expenditure. The Interest so earned will be treated as created to the Institute/Agency and shall be adjusted towards further installment of the grant and or at the time of Final Settlement of Accounts.
- 5.No International Travel will be undertaken from the sanctioned project grant unless specified otherwise.
- 6.The Registrar, Jai Narain Vyas University, Jodhpur, Rajasthan and The Registrar, Nagaland University, Zunheboto, Nagaland and The Registrar, North-Eastern Hill University, Shillong, Meghalaya would be responsible for submission of Statements of Expenditure (SoE), utilization certificates (UC), Assets Certificates, Manpower staffing & expenditure details in prescribed DBT formats to DBT in respect of grants released in this project from time to time.
- 7.PI's of DBT sponsored projects can consider appointment of JRF from Category-II merit list of DBT-BET exam so that candidates can be paid fellowships at par with NET/GATE/BET qualified candidates as per DST OM No. A.SR/S9/Z-09/2012 dated on 21 Oct 2014. However, there is no compulsion on PI's to select candidates for JRF in their projects from Category-II of DBT-BET.
- 8.As per Rule 236 (1) of GFR 2017, the accounts of all Grantee Institutions or Organisations shall be open to inspection by the sanctioning authority and audit, both by the Comptroller and Auditor General of India under the provision of CAG(DPC) Act 1971 and Internal audit by the Principal Accounts Office of the Ministry or Department, whenever the Institution or Organisation is called upon to do so.
- 9.If the Research Project involves biological resource, the obligations under the Biological Diversity Act 2002 as applicable shall be complied with by the Project Investigator, the details of such obligations can be accessed at www.nbaIndia.org
- 10.This Issues under the power delegated to this Department and with the concurrence of IFD vide their SAN No.102/IFD/SAN/348/2018-2019 dated May, 15 2018.
- 11.This sanction order has been noted at serial no. 43-44 in the Register of Grants.

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

To,
The Pay & Accounts Officer,
Department of Biotechnology,
New Delhi - 110 003.

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REGISTRAR
Jai Narain Vyas University
JODHPUR (Raj.)

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Copy to:

- 1 The Principal Director of Audit (Scientific Departments), DACR Building, New Delhi- 110 002.
- 2 Prof. Chitta Ranjan Deb(Project Co-ordinator), Department of Botany, Nagaland University, Lumami 798 627, Nagaland, India
- 3 The Registrar, Jal Narain Vyas University, Mohanpura Overbridge, Ratanada, Jodhpur - 342003, Rajasthan
- 4 The Registrar, Nagaland University, ., Zunheboto - 798627, Nagaland
- 5 The Registrar, North-Eastern Hill University, P.O: NEHU Campus, Mawkyntoh Umshing,, Shillong - 793022, Meghalaya
- 6 Dr. Asosli Paul, Assistant Professor, Botany, Nagaland University, Department of Botany, Nagaland University, Lumami-798627, Zunheboto - 798627, Nagaland
- 7 Dr. Nisha Tak, Assistant Professor, Botany, Jal Narain Vyas University, Department of Botany, Faculty of Science, New Campus, Pali Road, J.N.Vyas University, Jodhpur, Jodhpur - 342001, Rajasthan
- 8 Prof. Chitta Ranjan Deb, Professor, Department of Botany, Nagaland University, Department of Botany, Nagaland University, Headquarters: Lumami 798627, Zunheboto - 798627, Nagaland
- 9 Prof. Hukam Singh Gehlot, Professor, Botany, Jal Narain Vyas University, Department of Botany, Faculty of Science, New Campus, Pali Road, J.N.Vyas University, Jodhpur PIN: 342001, Jodhpur - 342001, Rajasthan
- 10 Prof. Satyawada Rama Rao, Professor, Department of Biotechnology and Bioinformatics, North-Eastern Hill University, Department of Biotechnology & Bioinformatics, North-Eastern Hill University, Shillong 793022, Shillong - 793022, Meghalaya
- 11 Cash Section, DBT (2 copies).
- 12 Sanction Folder.
- 13 File Copy.

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

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Jal Narain Vyas University
JODHPUR (Ref.)

Annexure -I

Details of the Equipment sanctioned for the implementation of the project titled "Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range":

Jai Narain Vyas University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	High Tech Poly house- Size: 16 X 32 feet	1	502000.00
2.	Growth Chamber/Glass house Size: 14' x 10' x 10' : 8' feet (L x W x H on one side : at other side)	1	266000.00
3.	High capacity (1000 lits) vertical refrigerators (1-10 degree Celsius) with stabilizer	1	230000.00
Total			998000.00
Nagaland University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	96 well Gradient Thermal Cycler with 2 KVA UPS	1	402000.00
2.	Electrophoresis systems with power pack (4 channel power supply) and accessories (gel caster, gel tray, combs etc)	1	160000.00
3.	-20 Degree Celsius Deep Freezer (Vertical) with stabilizer	1	160000.00
4.	1-10 Degree Celsius Laboratory Freezer with stabilizer (625 lits)	1	180000.00
Total			902000.00
North-Eastern Hill University			
SNo.	Name of Equipment	No.	Cost(Rs.)
1.	Gas Chromatograph (GC) for Acetylene Reduction Assay (ARA)	1	551000.00
Total			551000.00

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

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Jai Narain Vyas University
JODHPUR (RAJ.)

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Annexure -II

Details of the manpower sanctioned for the implementation of the project titled "Diversity and molecular characterization of microsymbiont-Legume association in Meghalaya and Nagaland for developing consortia of microsymbionts with wide host range":

Head	No. of Position	Year I	Year II	Year III	Total (Rs.)
1. Jal Narain Vyas University					
Junior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1	360000.00	360000.00		720000.00
Senior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1			402996.00	402996.00
Total(Rs.)		360000.00	360000.00	402996.00	1122996.00
2. Nagaland University					
Junior Research Fellow Manpower + 10% HRA	1	330000.00	330000.00		660000.00
Senior Research Fellow Manpower + 10% HRA	1			369996.00	369996.00
Total(Rs.)		330000.00	330000.00	369996.00	1029996.00
3. North-Eastern Hill University					
Junior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1	360000.00	360000.00		720000.00
Senior Research Fellow Rs. 25000.00 (1st and 2nd year), Rs. 28,000.00 3rd year + 20% HRA	1			402996.00	402996.00
Total(Rs.)		360000.00	360000.00	402996.00	1122996.00

Emoluments detail of research personal(s) mentioned in table(s) of Annexure-II shall be applicable only if candidate(s) met educational qualification and eligibility criteria as per DST OM No.SR/S9/Z-09/2012 dated 21.10.2014.

Mohd. Aslam
(Dr. Mohd Aslam)
Adviser

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Adviser

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REGISTRAR
Jal Narain Vyas Univ.
JODHPUR (Raj)

3.7.1.1: Total number of Collaborative activities with other institutions/ research establishing/industry for research and academic development of faculty and students year wise during the last five years							
Sl. No.	Title of the collaborative activity	Name of the collaborating agency with contact details	Name of the participant	Year of collaboration	Duration	Nature of the activity	Link to the rele
1	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	BHERA RAM	2020	14/04/2020 to 12 /05/2020	Asteroid Search	
2	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Hemakshi parmar	2020	14/04/2020 to 12 /05/2020	Asteroid Search	
3	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Dimpy choudhary	2020	14/04/2020 to 12 /05/2020	Asteroid Search	
4	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	BHERA RAM	2020	12/06/2020 TO 10/07/2020	Asteroid Search	
5	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	BHERA RAM	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
6	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	KAJOL KASERA	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
7	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	SONU CHOJHAN	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
8	Asteroid search Campaigns	All India Asteroid Search Campaign 2020 (aiasc@space-india.com)	PRAVEEN KUMAR	2020	13/07/2020 TO 10/08/2020	Asteroid Search	
9	Asteroid search Campaigns	International astronomical search collibration	BHERA RAM	2020	12/06/2020 TO 10/07/2020	Asteroid Search	
10	Asteroid search Campaigns	International astronomical search collibration	BHERA RAM	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
11	Asteroid search Campaigns	International astronomical search collibration	Hemakshi parmar	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
12	Asteroid search Campaigns	International astronomical search collibration	Dimpy choudhary	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
13	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Anitra godra	2020	09/10/2020 TO 03/11/2020	Asteroid Search	
14	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Heena kanwar	2020	09/10/2020 TO 03/11/2020	Asteroid Search	
14	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Heena kanwar	2020	02/08/2020 TO 27/08/2020	Asteroid Search	
15	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Akhita awasti	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
16	Application of geoinformatics in ecology	INDIAN INSTITUTE OF REMOTE SENSING	Kajol Kasera	2020	13/07/2020 TO 24/07/2020	online mode	
17	Earth Observation for carbon cycle stud	INDIAN INSTITUTE OF REMOTE SENSING	Urvashi soni	2021	21/06/2021 TO 25/06/2021	online mode	
18	Earth Observation for carbon cycle stud	INDIAN INSTITUTE OF REMOTE SENSING	Anjali Palariya	2021	21/06/2021 TO 25/06/2021	online mode	
19	Asteroid search Campaigns	International astronomical search-collibration	Ram raj mali	2020	09/10/2020 TO 03/11/2020	Asteroid Search	
20	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Shobha kumari	2020	12/08/2020 TO 08/09/2020	Asteroid Search	
21	Asteroid search Campaigns	DST Rajasthan (International astronomical search collibration)	Praveen Kumar	2020	12/08/2020 TO 08/09/2020	Asteroid Search	

Prof. & Head
Department of Chemistry
J.N.V. University, Jodhpur

MOHANLAL SUKHADIA UNIVERSITY : UDAIPUR

No.PD/OS/SPD-(RUSA-Phase-II)/CSA-1-(3)/2020-21 243

dt: 20-08-2020

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ORDER

In pursuance of MHRD Deptt. of Hr. Edu. New Delhi sanction letter No. 2447/2014-U.Policy (RJMMulti-Gen) dt: 03-02-2020 & Govt. of Rajasthan, State Project Directorate-RUSA, Jaipur letter No. F.30(16)/SPD/RUSA/2016/178 dt: 31-03-2020 & No. 316 dt: 06-08-2020, I am directed to convey financial sanction for payment of **Rs. 1750 lakh (Rupees seventeen Crore fifty Lakh)** only to the Dean/Director/Head of the Departments of concerned Colleges, MLSU, Udaipur for arranging payment to the Principal Investigator of Research Project as per list enclosed, as 1st Installment under Component 10: Research Innovation and Quality Improvement (Research Proposals) under RUSA-2.

Admissible expenditure be incurred as per relevant rules/procedure of sponsoring agency/State Project Directorate-RUSA Jaipur as well as of this University rules and as per guidelines of Nodal Officer-RUSA (enclosed vide No. RUSA/NODAL OFF./2016-17/163 dt: 14-08-2020) it shall be met out of Central/State Agencies budget under head **"CSA-1-(3)-IV-RI&QI (Research Proposals)-7-B-(a)-(i) / 7-B-(a)-(ii) / 7-B-(a)-(iii) / 7-C-(a)-(i) / 7-D-(i) / 7-D-(ii) / 7-E(a)-(i) / 7-E(a)-(ii) / 7-E(b)-(i) / 7-E(b)-(ii) / 7-F-(i) / 7-F-(ii) / 7-F-(iii) / 7-G-(i) / 7-I(a)-(i) / 7-K-(i) / 7-K-(ii) / 7-K-(iii) / 7-K-(iv) / 8-B-(i) / 8-C-(i) / 8-D-(i) / 9-A / 9-B-(i) / 9-C-(i) / 9-C-(ii) / 9-C-(iii) / 9-C-(iv) / 9-D-(i) / 9-E-(i) / 9-E-(ii) / 9-F-(i) / 9-F-(ii) / 9-G-(i) / 9-G-(ii) / 9-H-(i) / 9-H-(ii) / 9-I-(i) / 9-J-(i) / 9-K-(i) / 9-L-(i) / 9-L-(ii) / 9-P-(i) / 11-A-(i) / 11-A-(ii) / 11-A-(iii) / 11-A-(iv) / 11-A-(v) / 11-A-(vi) / 11-A-(vii) / 11-A-(viii) / 11-A-(ix) / 11-A-(x) / 12-(i) / 12-(ii) / 12-(iii) / 12-(iv)"** where in necessary provision shall be made in Revised Estimates 2020-21.

COMPTROLLER

Copy to:-

1. The Registrar, MLSU, Udaipur.
2. The Dean, UCCMS/UCoS/UCSSH, MLSU, Udaipur.
3. Prof. Kanika Sharma, Nodal-officer, RUSA-Programme, Deptt. of Botany, UCoS, MLSU, Udaipur with ref. to letter No. RUSA/NODAL OFF./2016-17/163 dt: 14-08-2020.
4. The Head Department of Physics/Chemistry/Botany/Zoology/Maths. & Stats./Env. Sci./ Geology/Pharmacy, UCoS, MLSU, Udaipur.
5. The Director, Computer Centre, MLSU, Udaipur.
6. The Head, Deptt. of Economics / English / Geography / Hindi / History / Library Sci. / Political Sci./ Psychology / Readymade Garments / Sociology / Incharge-Centre for Women Studies, UCSSH, MLSU, Udaipur.
7. The Head, Deptt. of Acctts. & Stats./B.B.E./Bus. Adm., UCCMS, MLSU, Udaipur.
8. The P.S. to Hon'ble Vice-Chancellor, MLSU, Udaipur.
9. The S.O. Bill/Compilation/Cheque, MLSU, Udaipur.
10. The R.E. File 2020-21.
11. The Officer Incharge, University Website, MLSU, Udaipur.
12. Guard file.

DY COMPTROLLER

List of R & I Project proposals approved by MHRD for Financial Grant under RUSA2.0

S.No	Department	Principal Investigator	Co-Investigator	Project Title	Total Amt.	Sanctioned Amount (1st Instalment)
					Budget Head- CSA-1(3)-IV	
1	Biotechnology	Dr. Nitish Rai	Dr. Namita Ashish Singh, Dr. Vivek Jain, Dr. Avinash Marwal	Evaluation of ne neuroprotective effect and its underlying molecular mechanism by Costus Speciosus, a traditional medicinal plant of Udaipur district, Rajasthan	3000000 7-E(b)-(i)	1500000
2	Biotechnology	Dr. Harshada Joshi	Dr. Avinash Marwal	Screening and Use of Calcite Solubilizing Bacteria for Restoration of Marble Slurry Contaminated Soil	3000000 7-E(b)-(ii)	1500000
3	Botany	Prof. Kanika Sharma	Dr. G.S. Deora, Dr. Vinit Soni, Dr. Rohini Trivedi, Dr. Jaya Arora, Dr. Harish, Dr. Kuldeep Sharma, Dr. Amit K. Gupta, Dr. Tripta Jain, Dr. Mukesh Meena	Capacity building and livelihood security of tribals of south Rajasthan through bioprospecting, biotechnological interventions and disease management of ginger	30598480 7-E(a)-(i)	15299240

[Signature]
 Head Office, RUSA
 MHRD

4	Chemistry	Dr. Jyoti Choudhary	Prof. Pinki Bala Punjabi, Dr. Shikha Agrawal, Dr. Poonam Khandelwal, Dr. Chetna Ameta, Dr. Dinesh Pandey, Dr. Neetu Kumari, Dr. Dinesh Kumar Yadav, Dr. Nitin Kumar, Dr. Prabh Kumar Baroliya, Dr. Sidharth Sharma, Dr. Rama Kanwar Khangarot, Dr. Gangotri Pemawat, Dr. Lokesh Kr. Agrawal, Ms. Himanshu Sharma, Dr. Pradhuman Singh Ranawat, Dr. Tarun Kumar, Dr. Devendra Singh, Mr. Vipin Khokher, Ms. Kiran Meena	Novel natural products from traditional medicinal plants of South Rajasthan region: Structural, synthetic and biological studies	47500000	23750000
			7-C-(a)-(i)			
5	Computer Sc.	Dr. Avinash Panwar	Prof. Deepak Khazanchi, Prof. K. Srinivas, Dr. Sumangla Rathore	A Customizable LMS for proper utilization and adoption of Global Knowledge Pool: An adaptation of contingency theory of E-learning	29295000	14647500
			7-I(a)-(i)			

Nodal Officer, USA
MLSD

6	Env. Science	Prof. B.R. Bamania	Prof. Nidhi Rai, Dr. D.S. Rathore, Dr. Anuya Verma	Environmental issues of urban & rural tribal areas of Southern Rajasthan	26538000 7-A-(i)	13269000
7	Geology	Prof. S.R. Jakhar	Ms. Neha Rathi	Remote Sensing Based Study of Dessicated Lik River of the Thar Desert for Demarcating its course, its Rejuvenation Possibilities and Social Benefits	2020000 11-A-(i)	1010000
8	Geology	Dr. Maya Choudhary	Prof. (Retd.) M.L. Nagori	Study of Ostracods and Foraminifers from the Bagh Group (Upper Cretaceous) of Lower Narmada Valley: Determination of Age (OAE2 and OAE3) events and their Paleogeographic Implications	3035000 11-A-(ii)	1517500
9	Geology	Dr. Harish Kapasya	Dr. Ritesh Purohit	A Study of Tectonic Evolution of the Neoproterozoic metasediments from Southern parts of Pali districts of Rajasthan	2950000 11-A-(iii)	1475000
10	Geology	Dr. Ankush Srivastava	Dr. Ashutosh K. Singh	Investigating the role of interoceanic exchange on Indian Ocean surface heat redistribution and its impact on Indian monsoon during Quaternary: A multi-proxy approach	4159000 11-A-(iv)	2079500
11	Geology	Dr. Anjali Singh	Dr. Sudhir Kumar, Dr. Avner Vengosh	Assessment of Ground Water Quality and mapping Human Health Risk of Drinking Ground Water Resources in Rajasthan State, India	4844000 11-A-(v)	2422000
12	Geology	Mr. Akhil Kumar Dwivedi	Prof. Jayanta Kumar Pati, Dr. Anil Dutt Shukla, Dr. Ritesh Purohit	Heavy Metal approportionment of Geogenic and Anthropogenic sources in Ganga River using Geomagnetic and Geochemical studies	4175000 11-A-(vi)	2087500

Nodal Officer
MLSU

13	Geology	Mr. Niranjana Mohanty	Dr. Ritesh Purohit, Dr. Rajnikant Patidar	Geochemistry and Isotope systematic of Ultramafic rocks of Phulad shear zone, Aravalli-Delhi fold belt, North West India: Implication on Geodynamic significance and Platinum Group Elements (PGEs) Metallurgy	3702800	1851400
					11-A-(vii)	
14	Geology	Mr. Rajanikant Patidar	Mr. Niranjana Mohanty	Geology, Geochemistry and Petrogenesis of Carbonates and Associated Rocks of Sirwasan area district Chota Udepur, Gujarat	2287800	1143900
					11-A-(viii)	
15	Geology	Mr. Subhash Chandra Janagal	---	Study of Mineralogical and Thermo-mechanical Properties of Clay Deposit from Bikaner district, Rajasthan.	1775000	887500
					11-A-(ix)	
16	Geology	Prof.(Retd.) Vinod Agrawal	Dr. Harish Kapasya	Geological and Geotechnical Studies of Commercial Marbles of Rajasthan	4104000	2052000
					11-A-(x)	
17	Maths & Stats.	Dr. Mahesh Puri Goswami		Applications of Bicomplex algebra to fundamental Electromagnetics using fractional calculus	542640	271320
					7-D-(i)	
18	Maths & Stats.	Dr. Pradeep Kumar Vishwakarma	Dr. Abhimanyu Singh Yadav	Bayesian Analysis of Lifetime Models- Application to the Survival Data	1321000	660500
					7-D-(ii)	
19	Pharmacy	Dr. Joohee Pradhan	Prof. Lalit Singh Chouhan, Dr. Shikha Agrawal	Conjunction Based Drug Design Approach in Search of Third Generation Anti epileptics: Design, Synthesis, Anticonvulsant Evaluation and Computer Aided Drug Design Studies of 4-(5-phenyl-1H-pyrazol-3-yl) Benzenamine derivatives.	5000000	2500000
					7-K-(i)	
20	Pharmacy	Dr. Garima Joshi	Dr. Deepak Choudhary, Dr. Harish	Design, Development and Characterization of Oral Nanoformulation for Treatment of Cancer	5000000	2500000
					7-K-(ii)	

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21	Pharmacy	Dr. Saurabh K. Sinha	Prof. Lalit Singh Chauhan	Design, Synthesis, Evaluation and kinetic studies of derivatives of 4-aminopiperidine as potential antianemic and cognition enhancing agents.	5000000	2500000
22	Pharmacy	Dr. Vivek Jain	Prof. Lalit Singh Chouhan,, Dr. Nitish Rai	In-vitro and In-vivo screening of poly herbal formulation (PHF-1) in age induced Alzheimer disease in mice	7-1k - (ii) 5000000	2500000
23	Physics	Prof. B.L. Ahuja	Dr. Gunjan Arora, Dr. Lekhraj Meena	Measurement of magnetic Compton profiles of spintronics and magnetocaloric materials	7-1k - (iv) 11560720	5780360
24	Physics	Prof. N. Lakshmi	Prof. Sudhish Kumar, Dr. Ghanshyam Purohit, Dr. Dinesh Patidar	Development and optimization of energy conversion and storage materials based on perovskites, ferrites and graphene	7-B-(a)-(i) 9550000	4775000
25	Physics	Prof. M.S. Dhaka	Dr. Shikha Agrawal	Fabrication of stable and high efficiency perovskite solar cell device	7-B-(a)-(ii) 8829600	4414800
26	Zoology	Prof. Arti Prasad	Dr. Girima Nagda	Survey and Analysis of Pesticide Residues in Consumable products (Fruits and Vegetables) Obtained from Different Vegetable market (Sabzi mandis) of Udaipur Region	7-B-(a)-(iii) 12000000	6000000
27	Zoology	Prof. Arti Prasad	Dr. Devendra Kumar	Surveillance and insecticide resistance mapping against mosquitoes of malaria, dengue and chikungunya in Southern Rajasthan and Bacterial bio-pesticide as an urgent alternate tool for resistance management and vector control.	7-F-(i) 11980000	5990000
					7-F-(ii)	

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28	Zoology	Dr. Vijay Kumar Koli	Dr. K.S. Gopi Sundar	Resource partitioning of three sympatric Ibis species (red-naped, Black-headed and Glossy) in Dungarpur district, Rajasthan: diet, habitat and landscape selection across seasons.	2896000	1448000
29	Centre for Women Studies	Dr. Garima Mishra	---	Impact Assessment of Awareness about Women's Legal Rights through Advocacy of Course on 'Women and Legal Rights'	7-F-(iii)	
					935000	467500
					9-I-(i)	
30	Economics	Prof. Sanjay Lodha	Dr. Neha Paliwal	Exploring the Multidimensional Impact of MGNREGA : A Case Study of Rajasthan.	4000000	2000000
			Dr. Deepa Soni	(A) Impact of MGNREGA on Women Empowerment in Rajasthan		
			Mr. Mukesh Meena	(B) Impact of MNAREGA on Purchasing power of Beneficiaries	9-B-(i)	
			Dr. Anita Joya	(C) An Assessment of impact of assets creation in MNREGA		
			Dr. Vinita Rajpurohit	(D) Impact of MGNREGA on Financial Inclusion		
31	English	Prof. Seema Malik	Dr. P. Trikha, Dr. Bhanupriya Rohila, Mr. M.S. Purohit, Dr. Neetu Parihar, Dr. Suresh Salvi	(E) Impact of MGNREGA on migration and employment generation in Rajasthan		
				Folklore of Vagad Region: Mapping oral Traditions	3145000	1572500
					9-K-(i)	
32	Geography	Dr. Bhanwar Vaishvendra Raj Singh	Dr. Bijay Singh Meena	Inclusive & Sustainable Development of Bombara, Boria, Sulawas, Sihad Gram Panchayat: Smart Village Initiatives	2500000	1250000
				Prediction Model for Road Accidents: A Case Study of Udaipur City, India	9-C-(i)	
					1500000	750000
33	Geography	Dr. Sabiha Khan	---		9-C-(ii)	

34	Geography	Dr. D.S. Chouhan	Prof. Seema Jalan, Dr. Shailesh Chaure	Impact of Water Quality on Health in Vagad Region of Rajasthan: An Application in Web-GIS	3004000 9-c-(iii)	1502000
35	Geography	Prof. Seema Jalan	Dr. Shailesh Chaure, Dr. Urmi Sharma	Electoral Information System for Governanace and Developmental Planning: A G-Governance Initiative	5725000 9-c-(iv)	2862500
36	Hindi	Dr. Ashish Sisodia		Mewari-vagad bolion ka hindi da sath tulnatmak addhyan	750000 9-L-(i)	375000
37	Hindi	Dr. Navin Kumar Nandwana	---	Aadivasi saamaj me parivartan aur samkalin hindi upanyas	1884000 9-I-(ii)	942000
38	History	Prof. Pratibha	Prof. Digvijay Bhatnagar, Dr. Peeyush Bhadviya, Dr. Kailash Chand Gurjar, Mr. Manish Shrimali	Evolving Strategies of Conserving Cultural Heritage of Udaipur	3003000 9-P-(i)	1501500
39	Library Sc.	Dr. P.S. Rajput	---	Automation of Libraty services: An easy access to electronic resources and enhancement of research activities	5475000 9-D-(i)	2737500
40	Mass Comm.	Dr. Kunjan Acharya		Contribution of mass media in socio-economic development of tribal sub plan areas of Rajasthan.	1540000 9-J-(i)	770000
41	Political Science	Prof. Sanjay Lodha	Dr. Sanjay Kumar	Analyzing Voting Behaviour in Rajasthan: Post- poll study of the 2019 Lok Sabha Elections	3838825 9-E-(i)	1919412
42	Political Science	Prof. Sanjay Lodha	Dr. Vijay Dixit, Dr. Satish Chand, Dr. Baludan Barathath	Impact of Social Welfare Policies on Voting Behaviour: Case study of Assembly Elections in Madhya Pradesh, Rajasthan and Gujarat, 2008- 2018	3603425 9-E-(ii)	1801713

50	Banking & Buss. Eco.	Prof. Renu Jatana	---	Changing India: Training and market access for organic farming	3543000	1771500
51	Business Adm.	Prof. Rajeshwari Narendran	Prof. Manju Baglmar, Dr. Hemraj Choudhary	Measuring the impact of Workplace Happiness upon individual & Organizational performance: An interdisciplinary Intervention with Yoga and Meditation	8-C-(i) 2935000	1467500
52	FMS	Prof. Anil Kothari	---	Economics of Temple- An empirical Study of Selected Temples of North India	8-D-(Ci) 1000000	500000
53	FMS	Prof. Hanuman Prasad	---	Digital Financial Awareness: A Study of 'X' and 'Y' Generation Citizens of Rajasthan	12-(ci) 1000000	500000
54	FMS	Prof. Meera Mathur	Dr. Shubham Goswami	Study on Sustainable Consumption Behaviour of Urban Consumers Towards Electronic Products in Rajasthan	12C(ii) 1500000	750000
55	FMS	Prof. Karunesh Saxena	---	Stress Management using Training Intervention Techniques among the Adolescent Students : A Study of major cities of Rajasthan.	12-(iv) 28370690	500000
56	Botany	Head, Botany		D S Kothari Central Research Facility	7-E (a)-(ii) 350000000	14185345
Total Rs.					350000000	175000000

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 Noted
 M.L.S.U

COMPTROLLER
 Mohanlal Sukhadia University
 UDAIPUR



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Mohanlal Sukhadia University, Udaipur – 313039
Office of the Nodal Officer-RUSA, MLSU
(Rashtriya Uchhatar Shiksha Abhiyaan)



Prof. Kanika Sharma
Nodal Officer, RUSA
MLSU

RUSA/NODAL OFF./2016-17/ 163

Date: 14.08.2020

To
Comptroller,
Mohanlal Sukhadia University,
Udaipur.

Sub.: Financial Sanction for R & I Projects under RUSA 2.0
Ref.: No. F30(16)SPD/RUSA/2016/178 dated 31.03.2020

Dear Sir,

With reference to above you are requested to grant Financial sanction for the R & I proposals submitted and approved by MHRD under RUSA 2.0 as per the list enclosed so that work may be commenced on these projects.

Further you are requested to issue the sanction to individual PI with the instruction that all payments will be done through treasury after submission and approval of FVC bills by the PI. Also kindly issue the following guidelines to all PI with regard to the expenditure and implementation of project:

1. GF & AR i.e. Financial Rules and norms of Government of Rajasthan are to be followed.
2. The expenditure will be incurred as per the RUSA guidelines, PAB approvals and DPR submitted by the PI to the institution and forwarded to MHRD.
3. Proper accounts of the expenditure incurred out of the grant are to be maintained and ensure utilization of funds only under approved budget heads. A separate stock register and cash book must be maintained for RUSA grant.
4. Utilization certificate in the GFR 12-C showing clearly the actual expenditure incurred under various heads above and the unspent balance available with the PI, shall be furnished to the University, within 3 months from the receipt of the fund. Non submission of UC on time shall debar PI from release of next installment.
5. The final UC of complete grant supported by audited statement of expenditure to the effect that the grant has been utilized for the purpose for which it has been sanctioned shall be furnished to the SPD office by the institution on the basis of UC submitted by individual PI.
6. Audited record of assets acquired wholly or substantially out of the grant and a Register of Assets shall be maintained.
7. RUSA account details for receipts and payments shall be mapped on PFMS portal to facilitate fund transfer and monitoring.
8. The Council of SPD or its nominee shall have the right to check/verify the accounts to satisfy that the funds have been utilized for the purpose for which they were sanctioned.

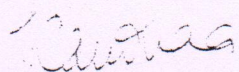
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- 15
9. FUND TRAKER FORM and Geotag Photographs on Bhuvan portal depicting the progress of implementation for activities carried out under the project are to be updated at periodic intervals showing three stage of implementation, i.e. (a) Before commencement, (b) The intermediate stage and (c) After the completion of the project.
 10. No constructions is allowed under RUSA2.0
 11. Any Renovation of existing facility will be allowed but only if it has been mentioned in the project proposal submitted to Rusa Nodal Officer.
 12. Renovated facility and Equipment created/ acquired under the grant should display the RUSA logo for which this grant is being used.
 13. Monthly progress report shall be submitted to the RUSA Nodal officer who will forward it to SPD RUSA for monitoring.
 14. Monitoring will be based on action plans submitted along with the proposals and achievements made with respect to a set of norms as defined by the institutional development plan.
 15. No change in the approved DCF/DPF/Proposals will be done at PI level. In case it is essential to undertake modification in the approved activities, the proposal for revision in DCF will first be discussed and approved in BOG of the institute and then submitted to SPD/RSHEC for approval of proposed changes with justification note and copy of BOG minutes.

Thanking you,

Yours Sincerely,



(Prof. Kanika Sharma)
Nodal Officer RUSA-MLSU

Noda. Officer RUSA-
MLSU

Applicant

First Name(s): **Robert**
Surname(s): **Popek**
Sex: ☒ M ☐ F Nationality: **Polish**
Place and date of birth: **Plock, Poland, 11.01.1984**
Home address: **Malborska 4/75**
Zip Code: **03-286** City: **Warsaw** Country: **Poland**
Passport No.: **AV 1291284**
Phone number: **+48787245973** E-mail: **robert.popek@gmail.com**
Education level: **Phd.**
Web references (if any):

Home Institution/Company (EU)

Name: **Institute of Dendrology, Polish Academy of Sciences**
Address: **Parkowa 5**
Zip Code: **62-035** City: **Kórnik** Country: **Poland**
Designation of the applicant: **Biologist**
Main responsibilities of the applicant: **Head of the scientific grant: Understanding the importance of trees and shrubs in phytoremediation of particulate matter in the air in urban areas.**
Website: **www.idpan.poznan.pl/**
Contact person (Director or Responsible): **Piotr Karolewski**
Designation of the contact person: **Director of Laboratory of Ecology**
Contact person Tel. No.: **+48-618170033** Email: **idkornik@man.poznan.pl**

Host Institution/Company (INDIA)

Name: **Jai Narain Vyas University**
Address: **New Campus, Jodhpur, Rajasthan, India**
Zip Code: **342001** City: **Jodhpur** Country: **India**
Website: **www.jnvu.edu.in**
Contact person: **Gyan Singh Shekhawat**
Designation of the contact person: **Gyan Singh Shekhawat**
Contact person Tel. No.: **+91-9414279665** Email: **gyans.shekhawat@gmail.com**

Requested grant

Requested duration of the mobility (specify months/days): **2 months**
Period of stay in India (broad period corresponding to invitation from host): **2 months**
More than one person will apply for this project? ☐ YES ☒ NO
Full Name of the other applicant(s):

Please attach: 1) a color scanned copy of the Passport; 2) a personal CV (possibly in EU format); 3) invitation letter from the host Institution/Company; 4) any other document that you think can help us to evaluate your project proposal.

Place and date: **Kórnik, 24.08.2017**

Signature of the Applicant

Signature of the Director of the Home Institution/Company

Faculty of Science
Jai Narain Vyas University, Jodhpur

Prof. Sunita Kumbhat
Dean

No. JNVU/Dean Sc./2017/ 699

28 Dec 2017

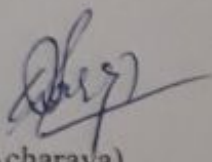
To,
Dr. Laura Micheli
Associate Professor in Analytical Chemistry,
University of Rome Tor Vergata
Via della Ricerca Scientifica 00133-Rome, Italy

Sub: Invitation to Dr. Laura Micheli, under TECO Program: Technological Eco-Innovation for the Quality Control and the Decontamination of polluted waters and Soils

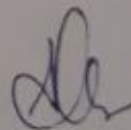
Dear Dr. Micheli,

We are happy to invite you to the Department of Chemistry, Faculty of Science, Jai Narain Vyas University, Jodhpur (Rajasthan) India, as host institute under TECO program and extend Laboratory space and research facilities to carry out research in the field of development of Sensors and Biosensors of environmental importance in collaboration with Dr. Sunita Kumbhat, Professor of Chemistry for a period of 1-2 Months during year 2018.

We look forward for a fruitful scientific collaboration with Department of Chemistry, JNV University, Jodhpur.



(Seema Acharaya)
Head, Department of Chemistry



(Sunita Kumbhat)
Dean, Faculty of Science

DEAN
FACULTY OF SCIENCE
J.N. VYAS UNIVERSITY
JODHPUR

A
Report On
Two Weeks Training Program
On
SMART GRID TECHNOLOGIES
As A Part Of Twinning Activity Under TEQIP-III, NPIU, MHRD,
Government Of India

Organized By



Department Of Electrical And Electronics Engineering
Coimbatore Institute Of Technology,
Coimbatore- 641 014.
30.12.2019 – 10.01.2020

Submitted To:-



Department Of Electrical Engineering
MBM Engineering College Jodhpur

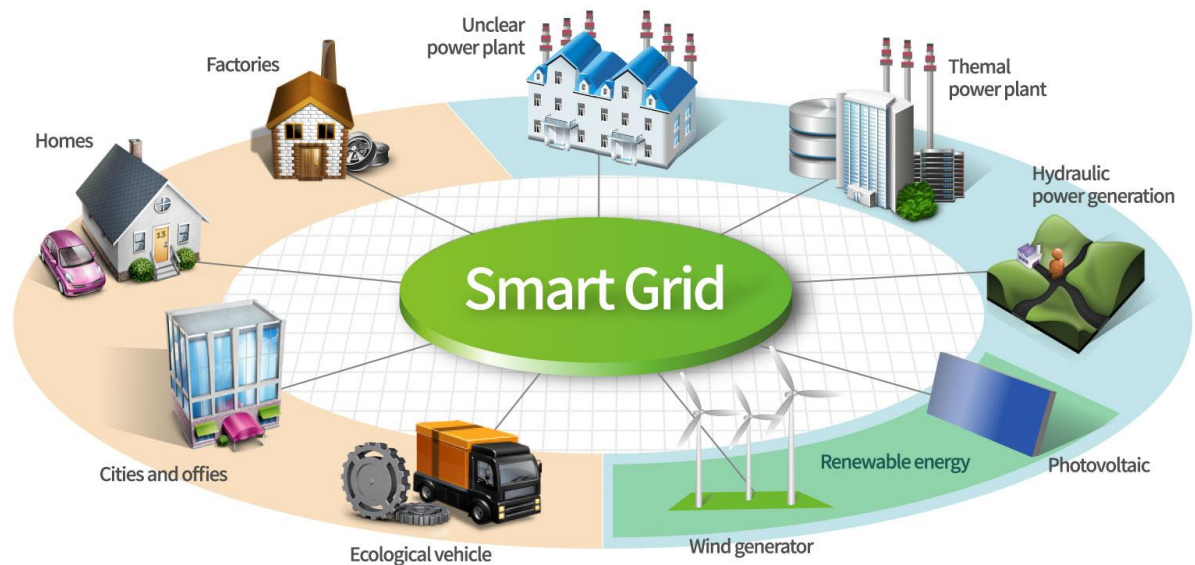
Course Contents

- Introduction to smart grid
- Fundamentals of solar photovoltaic
- Design of solar PV system design
- Wind energy conversion system
- Plug in hybrid electrical vehicles in smart grid
- Energy storage technologies
- Demand response management
- Protection in smart grid
- Distribution system automation
- Communication technologies for smart grid
- Cyber , physical and system security of smart grid
- AI and ML in smart grid
- Data analytics in smart grid
- Distribution business and power trading
- Hands on training of solar PV cell Fabrication
- Hands on training of the characteristics of solar PV module
- ARM and IoT laboratory
- Industrial visit to solar PV plant and wind farm

Introduction to Smart Grid

(30/12/2019) By Dr.V. Manikandan

“Prepare for an electric system that is cleaner and more efficient, reliable, resilient and responsive” – a smart grid.



- Electric industries make the transformation from a centralized, producer-controlled network to one that is less centralized and more consumer-interactive.
- This promises to change the industry's entire business model and its relationship with
 - ✓ all stakeholders
 - ✓ utilities
 - ✓ regulators
 - ✓ energy service providers
 - ✓ technology and automation vendors
 - ✓ all consumers of electric power

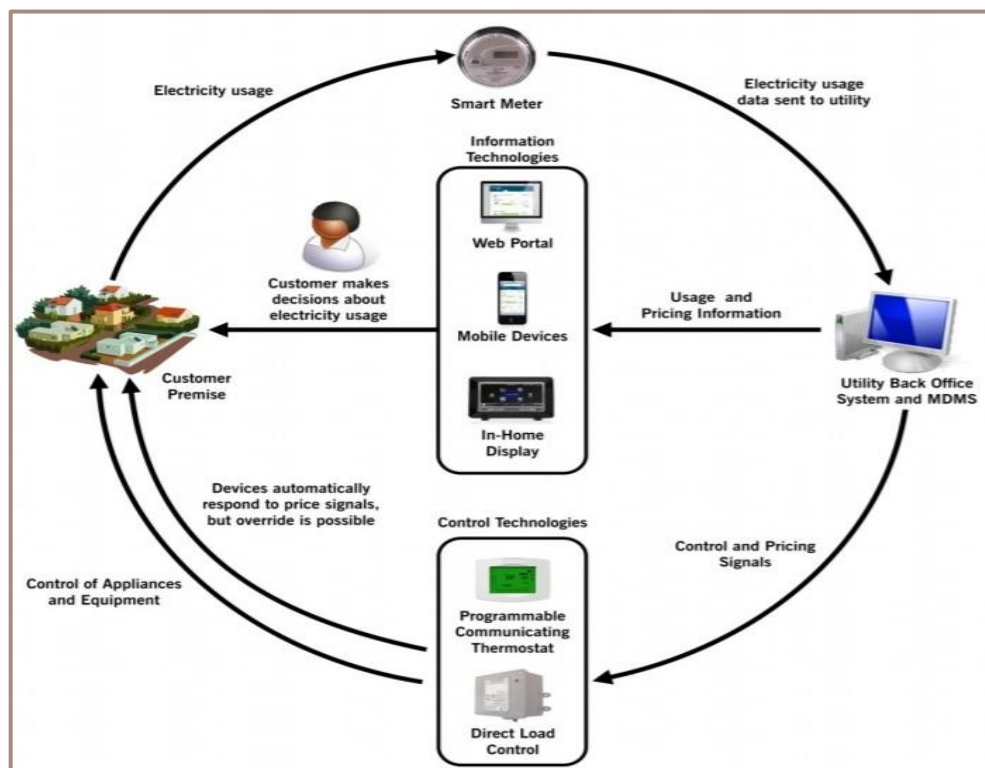
- A smart grid makes this transformation possible by bringing *concepts and technologies that enabled the internet to the utility and the electric grid.*

Concepts in Action

- Two-way Digital Communication
- Enabling Technologies
- Plug-and-Play Capabilities
- Interoperability Based on Standards,
- Low-Cost Communication and Electronics

Advanced Metering Infrastructure (AMI)

- An approach to integrating consumers based upon the development of open standards.
- Consumers with the ability to use electricity more efficiently
- Utilities with the ability to detect problems on their systems and operate them more efficiently.
- AMI enables consumer-friendly efficiency concepts like “Prices to Devices”



Fundamental Of Solar Photovoltaics

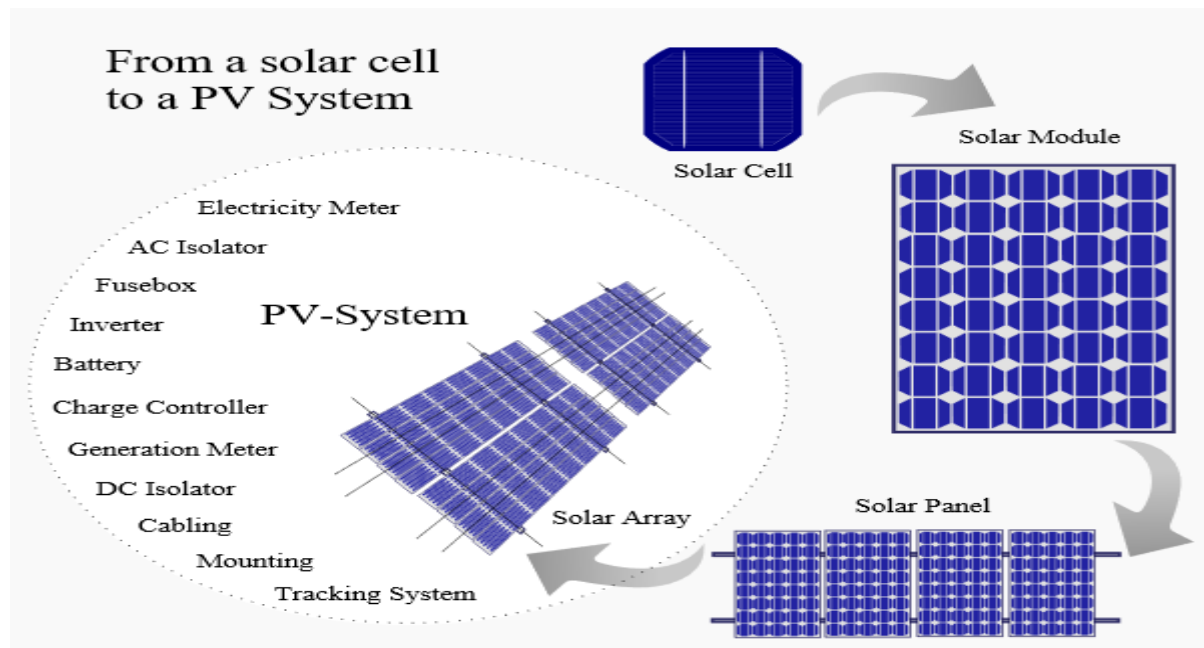
(30/12/2019) By Dr.E.Chandira shekhran

Photovoltaics (PV) is the conversion of light into electricity using semiconducting materials that exhibit the photovoltaic effect, a phenomenon studied in physics, photochemistry, and electrochemistry.

PV has become the cheapest source of electrical power in regions with a high potential in 2020. Panel prices have dropped by the factor of 10 within a decade. This competitiveness opens the path to a global transition to sustainable energy which would be required help to mitigate global warming.

2 to meet the 1.5 degree target would be used up in 2028 if emissions remain on the current level. However, the use of PV as a main source requires energy storage systems or global distribution by High-voltage direct current power lines causing additional costs.

Solar PV has specific advantages as an energy source: once installed, its operation generates no pollution and no greenhouse gas emissions, it shows simple scalability in respect of power needs and silicon has large availability in the Earth's crust.



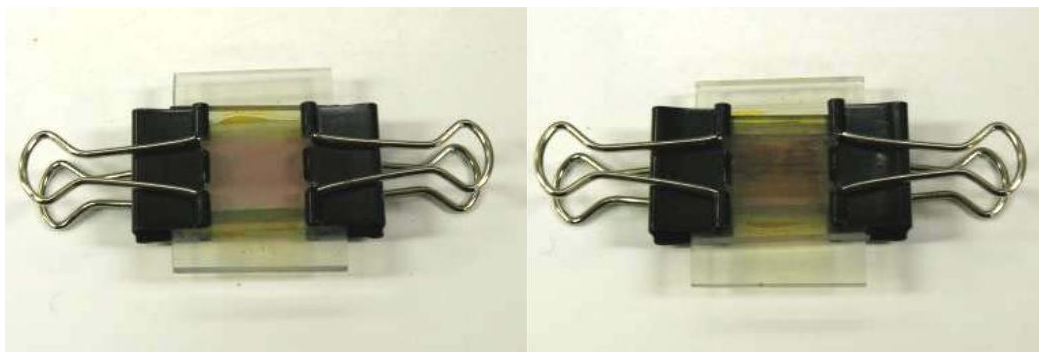
Hands on Training of the Solar PV cell fabrication

(30/12/2019)

Fabrication procedure of dye-sensitized solar cells

Materials

- ITO(Indium doped Tin Oxide) glass (2 x 2 cm, 2 slides for 1 cell)
- Dye (Eosin Y, Eosin B, etc.)
- Ethanol
- TiO_2 paste
 - Suspend 3.5g of TiO_2 nano-powder P25 in 15ml of ethanol.
 - Sonicate it at least for 30 min.
 - Add 0.5ml of titanium(IV) tetraisopropoxide into the suspension.
 - Mix until the suspension is uniform.
- Liquid electrolyte
 - 0.5M lithium iodide and 0.05M iodine in acetonitrile. γ -Butyrolactone or 3-methoxypropionitrile is also recommended as a solvent to improve its volatility.
- Binder clips (small, 2 pieces for 1 cell)



Front side (TiO_2 /dye electrode) Back side (counter electrode side)

Equipment

- Light source (OHP, Halogen lamp, Xe lamp, etc.)
- Cables
- Variable resistance
(or switchable fixed resistances

ex. 50, 100, 200, 500, 800, 1k, 2k, 5k, 10k, 20k, 40k, 80k, 100k, 200k, 400k and 800k Ω)

- Voltmeter

1. Connect solar cell, variable resistance and voltmeter with cables.
2. Shine the light from the side of TiO_2 /dye electrode.

(Note; Light intensity has to be known in advance to calculate power conversion efficiency. It can be measured by a power meter or a calibrated photodiode.)

3. Set the resistance at maximum value and record voltage.
4. Decrease the resistance and record voltage.
5. Repeat 4 until the voltage reaches nearly zero and turn the light off.

6. Calculate corresponding current at each recorded point.

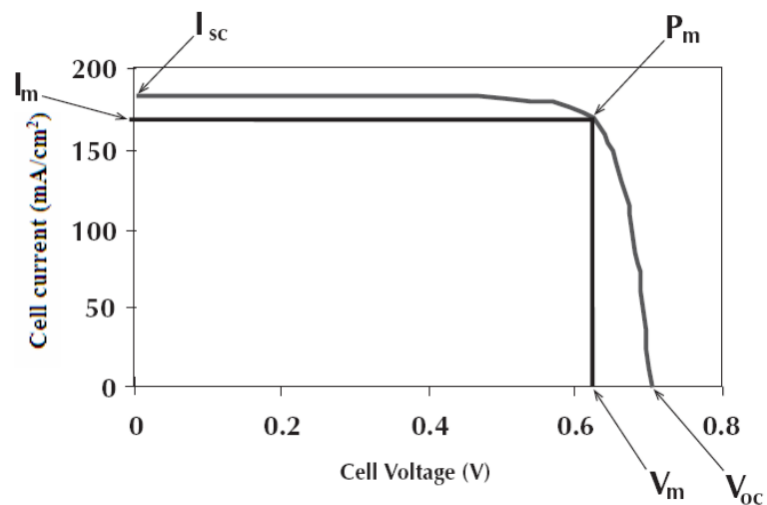
$$I = V/R$$

7. Plot voltage (X-axis) vs current (Y-axis).

8. Plot voltage (X-axis) vs power (Y-axis) to find P_m .

9. Calculate fill-factor (ff).

$$ff = \frac{I_m \times V_m}{I_{sc} \times V_{oc}} = \frac{P_m}{I_{sc} \times V_{oc}}$$



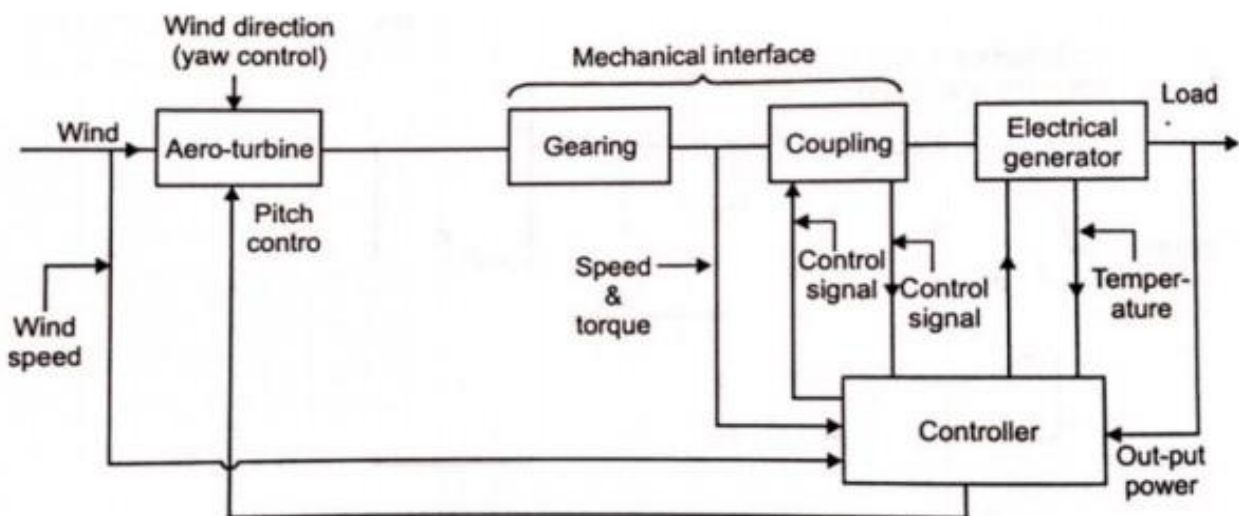
I-V characteristics of a typical solar cell

Wind Energy Conversion System

(31/12/2019)By Dr.J.Devishree

Wind power production has been under the main focus for the past decade in power production and tremendous amount of research work is going on renewable energy, specifically on wind power extraction. Wind power provides an ecofriendly power generation and helps to meet the national energy demand when there is a diminishing trend in terms of non-renewable resources.

The wind energy conversion system (WECS) includes wind turbines, generators, control system, interconnection apparatus. Wind Turbines are mainly classified into horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT). Modern wind turbines use HAWT with two or three blades and operate either downwind or upwind configuration. This HAWT can be designed for a constant speed application or for the variable speed operation. Among these two types variable speed wind turbine has high efficiency with reduced mechanical stress and less noise. Variable speed turbines produce more power than constant speed type, comparatively, but it needs sophisticated power converters control equipments to provide fixed frequency and constant power factor



Cyber , Physical and System Security of Smart Grid

(31/12/2019) By Dr. M. Sangeeta

Cyber:

Cyber refers to imaginary space, which is created when the electronic

devices communicate, like network of computers.

Cyber Crime:

Cyber Crime is nothing but where the computer used as an object or subject of crime.

There are three types of hackers:

- White
- Black
- Grey (W+B)

Traditionally, power grid automation systems have been physically isolated from the corporate network. This has been changing, perhaps due to the cost effectiveness of utilizing public networks. Using public networks considerably increases the vulnerability of power grids to cyber attacks by increasing the exposure surface of these networks.

Design Principle:-

Three layers:

- Power
- Automation & Control
- Security

➤ Provides clear demarcation of control and security functionalities.

- Scalability: security performance remain unabated with increase in load and system volume.
- Extendibility: able to handle any future state of power grid.
- Can be integrated into the existing, legacy systems in a non-intrusive fashion.

Plug In Hybrid Electrical Vehicles In Smart Grid

(31/12/2019) By Dr. G. Manavlan

The Plug-in Electric Vehicles (PEVs) are the Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs). PEVs will dominate the transportation in the personal mobility mode and in the automobile market by 2030. Widespread adoption of PEVs brings potential, social and economic benefits. The focus on promoting use of electric vehicles in road transportation is very essential to meet the climate change targets and manage the ever hiking prices of fast depleting fossil fuels. However, there are lots of uncertainties in the market about the acceptability of PEVs by customers due to the capital and operation costs and inadequate infrastructure for charging systems. The penetration level in the market is not encouraging, in spite of incentives offered by Governments. Manufacturers are also not sure of the market, even though predictions are strong and attractive. Major manufacturers, however, are already ready with their plans to introduce electric vehicles to mass market. The use of PEVs has both technological and market issues and impacts. Series of research works have been reported to address the issues related to technologies and its impacts on political, economic, environmental, infrastructural and market potential aspects. Works dealing with suitable infrastructure such as charging stations and use of smart grids are reported. These steps are aimed to bring down the capital and operational costs that are comparable to the costing of conventional transport vehicles. The penetration level of PEVs in transportation will accordingly increase and keep the climate targets met and conserve fossil fuels for use in other economic segments.

Energy Storage Technologies

(31/12/2019) By Prof. S. Elango

Energy storage technologies involve the process of converting energy that is difficult to store to more conveniently or economically storable forms. A variety of energy storage systems are available and the efficiency of the system mainly depends upon the identification and implementation of the right system based on the parameters such as storage capacity, cost, reliability, size and lifetime.

Another most important factor to be considered is the environmental impact.

Based on the storage period, the energy storage system can be classified as follows,

Long-term energy storage system:

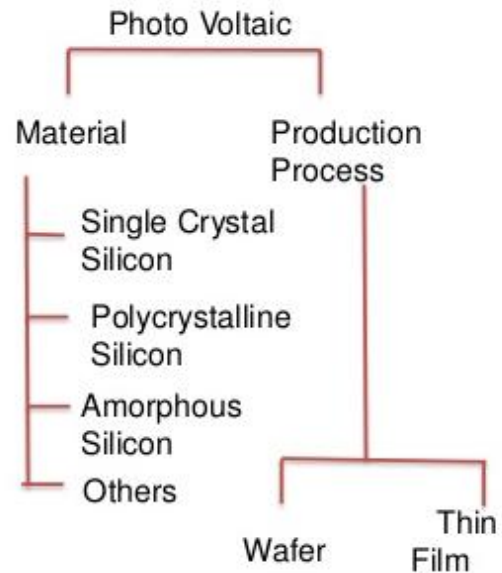
- 1) Compressed air energy storage,
- 2) Battery,
- 3) Hydrogen storage.

Short-term energy storage system:

- 1) Super capacitor,
- 2) Flywheel

Design of solar PV system design

(02/01/2020) By Dr. E. Chaindra Shekhar



Cell: The basic photovoltaic device that is the building block for PV modules.

Module: A group of PV cells connected in series and/or parallel and encapsulated in an environmentally protective laminate.

Panel: A structural group of modules that is the basic building block of a PV array.

Array: A group of panels that comprises the complete direct current PV generating unit.

Inverter: Inverters take care of four basic tasks of power conditioning:

- Converting the DC power coming from the PV modules or battery bank to AC power
- Ensuring that the frequency of the AC cycles is 60 cycles per second
- Reducing voltage fluctuations
- Ensuring that the shape of the AC wave is appropriate for the application, i.e. a pure sine wave for grid-connected systems

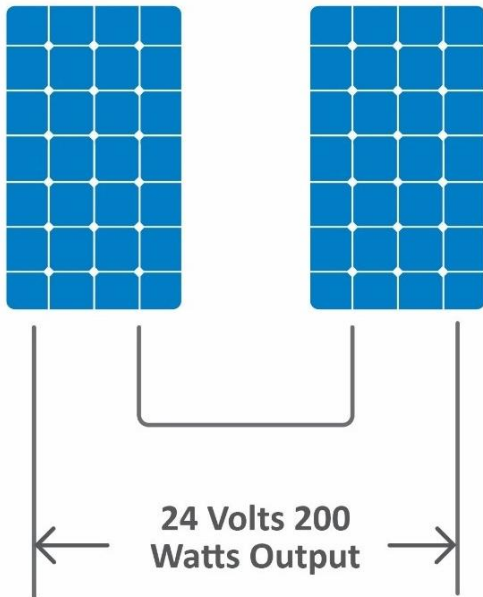
System Components: Pre-engineered photovoltaic systems can be purchased that come with all the components you will need, right down to the nuts and bolts. Any good dealer can size and specify systems for you, given a description of your site and needs. Nevertheless, familiarity with system components, the different types that are available, and criteria for making a selection is important.

Basic components of grid-connected PV systems with and without batteries are:

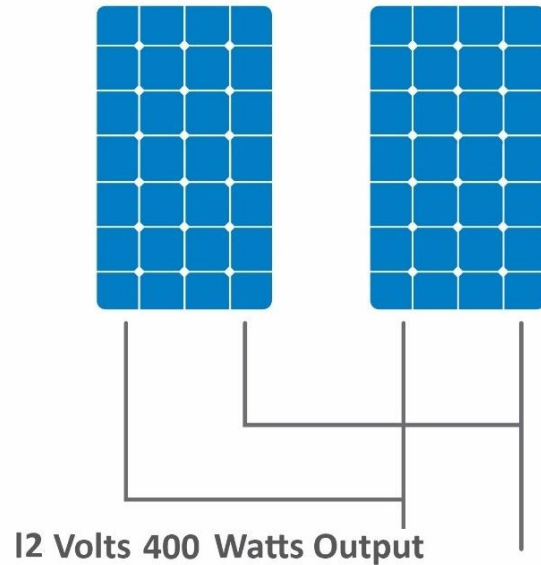
- Solar photovoltaic modules
- Array mounting racks
- Grounding equipment
- Combiner box
- Surge protection (often part of the combiner box)
- Inverter
- Meters – system meter and kilowatt-hour meter

Hands On Training Of The Characteristics Of Solar PV Module

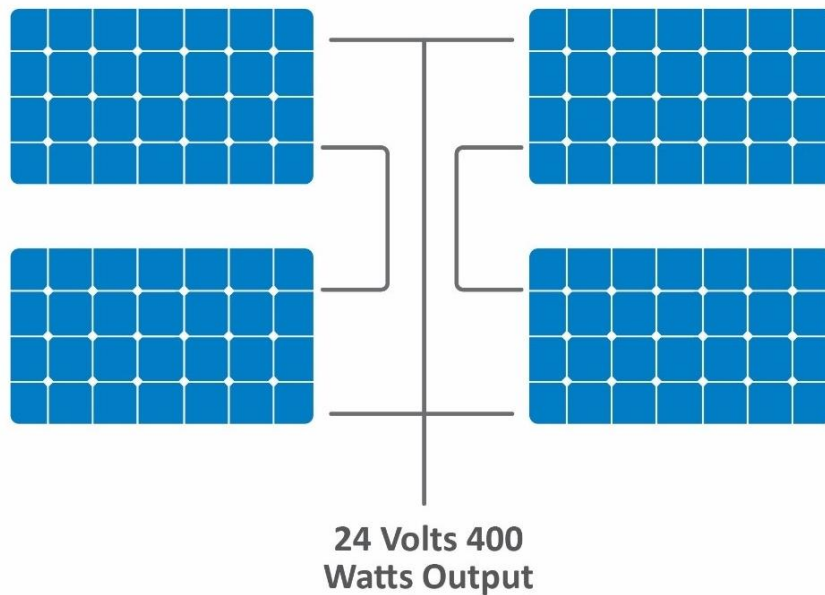
Series Connection



Parallel Connection



Series - Parallel Connection

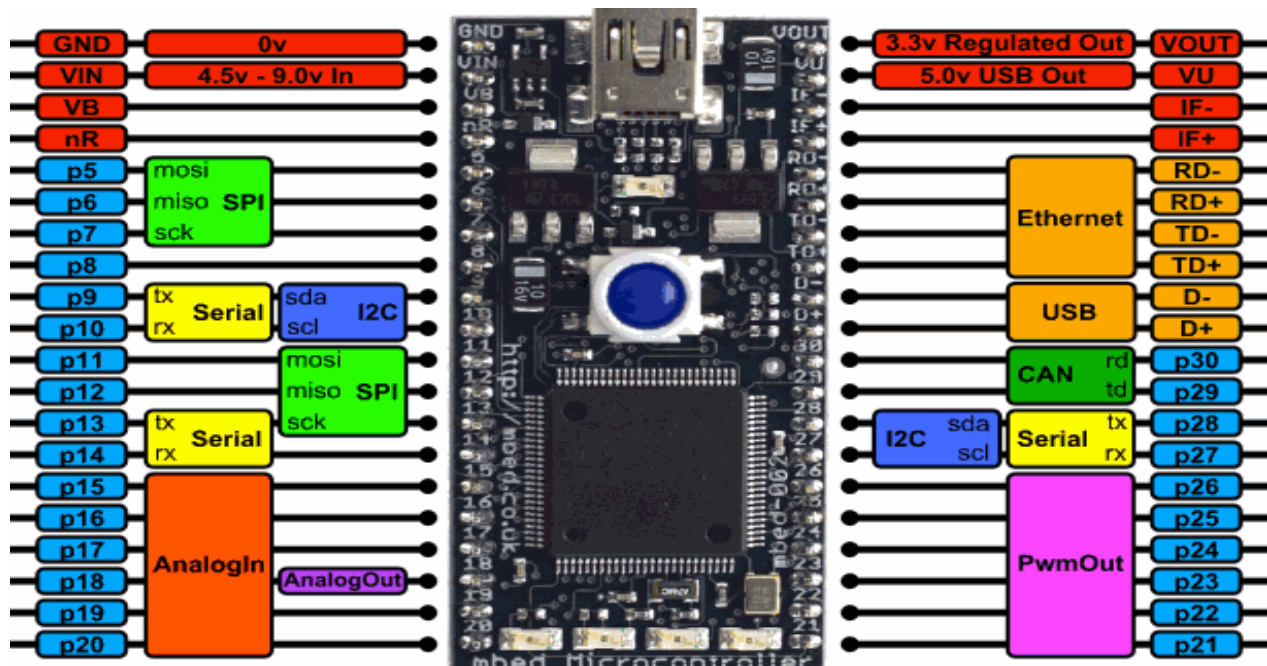


ARM and IoT Laboratory

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

An embedded system is a computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electrical system. It is *embedded* as part of a complete device often including electrical or electronic hardware and mechanical parts. Because an embedded system typically controls physical operations of the machine that it is embedded within, it often has real-time computing constraints. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors manufactured are used in embedded systems.

The embedded system used in the hands-on experience was arm mbed LPC 1768.



Industrial Visit

(4/01/2020)

1) Swelect Energy Ltd.

Private solar energy park majorly used for research and development purpose. Plant size of 1.1MW and two types of panels are used over their :

- Cadmium telluride(thin film)
- Silicon PV(thin film)

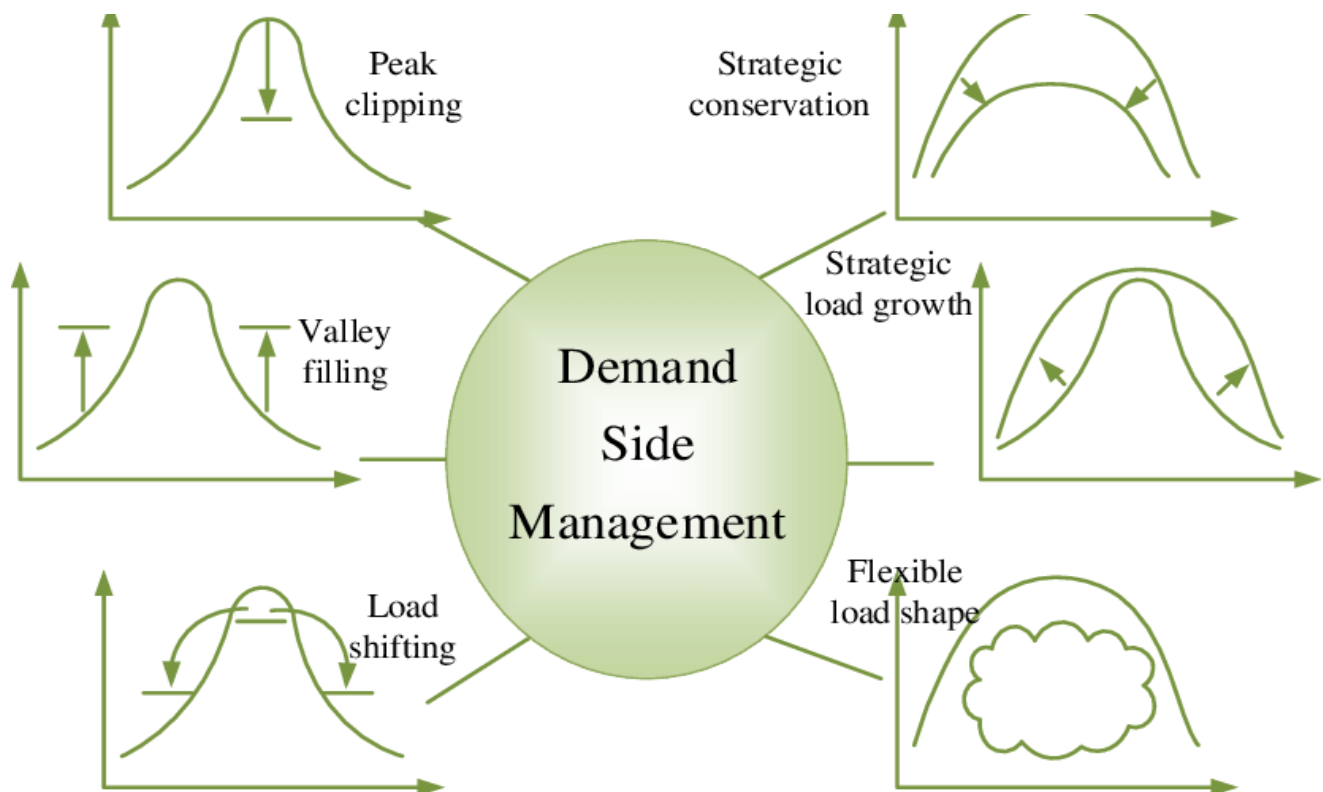
Plant uses solar tracking system with help of stepper motor and Solar irradiance meter. The plant also has a Zero Mass Water Source-SOURCE that machine is used to absorb moisture contains in air to make water to drink.

2) Swathi Wind Farm



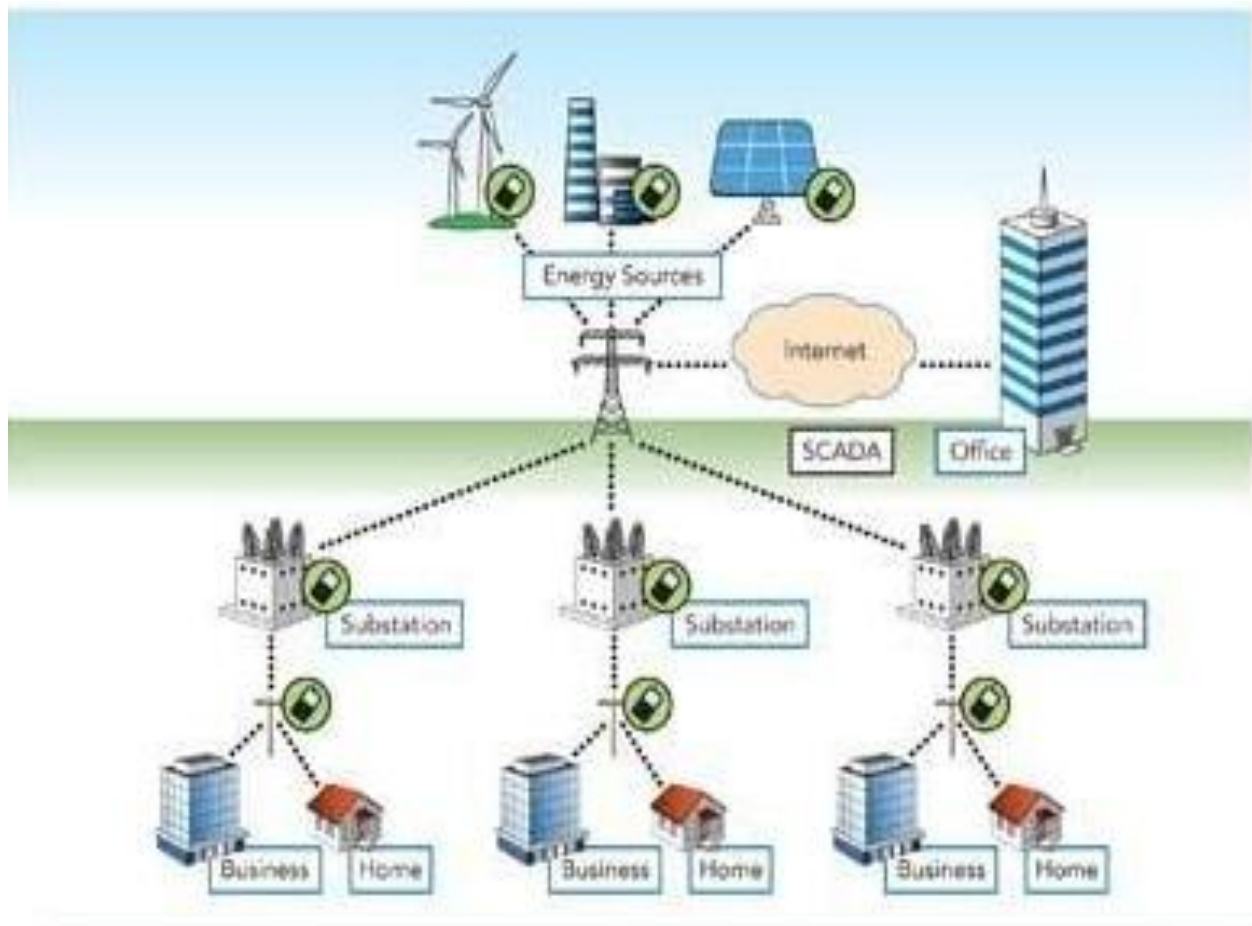
Demand Response Management

Demand response is a change in the power consumption of an electric utility customer to better match the demand for power with the supply. Until recently electric energy could not be easily stored, so utilities have traditionally matched demand and supply by throttling the production rate of their power plants, taking generating units on or off line, or importing power from other utilities. There are limits to what can be achieved on the supply side, because some generating units can take a long time to come up to full power, some units may be very expensive to operate, and demand can at times be greater than the capacity of all the available power plants put together. Demand response seeks to adjust the demand for power instead of adjusting the supply.



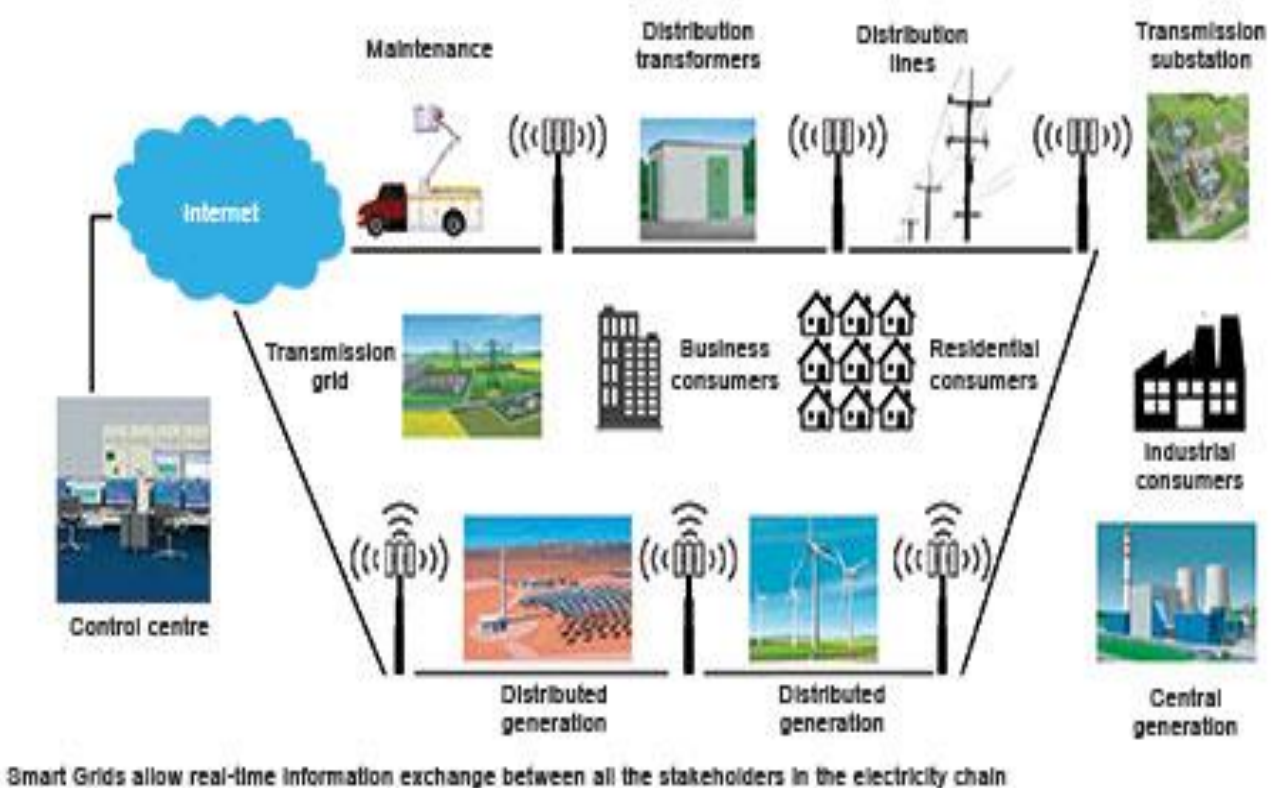
Distribution System Automation

Distribution automation (DA) optimizes a utility's operations and directly improves the reliability of its distribution power system. Adding targeted distribution automation capabilities can be economical when they are an extension of your existing SCADA investments and the communication infrastructure. The success or failure of an automation program hinges on proper selection of equipment and communications to seamlessly integrate data into the utility control room. The key is to choose equipment that leverages your current assets wherever possible. With the latest in high speed communication technology, there has never been a better time for utilities to extend their automation beyond the substation.



Communication Technologies For Smart Grid

The smart grid is a new generation of standard power distribution grid. The communication infrastructure is critical for the successful operation of the modern smart grids. The use of communication technologies ensures the reduction of energy consumption, optimal operation of the smart grid and coordination between all smart grids' components from generation to the end users. The Smart Grid can be defined as an electric system that uses information, two-way, cyber-secure communication technologies, and computational intelligence in an integrated fashion across the entire spectrum of the energy system from the generation to the end points of consumption. The availability of new technologies such as distributed sensors, two-way secure communications, advanced software for data management, and intelligent and autonomous controllers have opened up new opportunities for changing the energy system. The main objective is to develop a measurement science toward communication networking with the specific aim of strengthening modeling capabilities and determining the potential impact on critical infrastructure.



Protection In Smart Grid

The smart grid brings opportunities and challenges to the power system protection and control. Fast advancement in communication and measurement techniques accelerates the development of wide-area protection, based on the wide-area measurement system. Smart microgrid is essential in modern power systems to supply electrical energy in abnormal conditions and ensure the continuity of power throughout the day under islanded mode. It is the simple power grid integrated with renewable energy sources, power modulators, and modern communication systems. This work is concentrated with various faults occurred in microgrid and its protection with digital relays. Smart Microgrid uses Solar and wind energy systems combined with AC grid and supplies energy via transmission and distribution network. On grid solar inverter is used to convert solar power in to AC power required for grid connection.

AI And ML In Smart Grid

In recent years, there is a rush in Artificial Intelligence (AI) research to produce practical solutions for the Smart Grid, the anticipated new generation of energy (primarily electricity) networks that will be able to make efficient use of renewable energy sources, support real time and efficient demand response, as well as the large-scale deployment of electric vehicles (EVs). AI techniques and methodologies can be instrumental in addressing sustainability problems, for example to increase the efficiency and effectiveness of the way we manage and allocate our natural and societal resources. The drive to use AI for the Smart Grid has in turn led to novel questions and challenges for AI research, and to the realization that only the cross-fertilization of ideas and mixing of various techniques originating in different (sub-)fields can lead to the Holy Grail of an electricity Grid that takes full advantage of AI technologies to deliver power that is at the same time “green”, stable, affordable, and accessible to all. This Special Issue brings together research questions and approaches originating in different (sub-)fields – such as multiagent systems, machine learning, optimization, and statistics. As such, it provides an overview of a broad spectrum of ongoing Smart Grid research.

Data Analytics In Smart Grid

Data analytics are now playing a more important role in the modern industrial systems. Driven by the development of information and communication technology, an information layer is now added to the conventional electricity transmission and distribution network for data collection, storage and analysis with the help of wide installation of smart meters and sensors.

With the fast development of digital technology and cloud computing, more and more data are produced through digital equipment and sensors, such as smart phones, computers, advanced measuring infrastructures, etc., as well as through human activities and communications. For instance, the size of data on the internet is now measured in exabytes (10^{18}) and zettabytes (10^{21}). Rational, effective and efficient analysis of these data brings huge value and benefit to our daily life and company activities. However, the collected data are mounting at an exponential growth, and the structure of them is also becoming much more complicated. The processing and analysis method of these large volume data is a new challenge but opportunity at the beginning of this century with the concept of “big data”

Conclusion

Because of the potential importance of smart grid, this comprehensive survey explores the technologies used in smart grid. We have studied the main smart grid projects/programs/trials and three major technical systems smart grid: intelligent system infrastructure, intelligent management system, and intelligent protection system. We have outlined challenges and future research lines worth exploring for each of these three systems.

We divided further intelligent infrastructure into three subsystems: intelligent power subsystem, the subsystem of intelligent information, and intelligent communication subsystem. For intelligent energy subsystem, we have reviewed the work of generation, transmission, and distribution. We have also described two important new paradigms of the grid: microgrid and G2V/V2G. For the subsystem of intelligent information, we reviewed the work in the measurement information, measurement and management. For intelligent communication subsystem, we reviewed the wireless communication technologies and cable and communication management from end to end.



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*36th National Convention of Electrical Engineers and
Conference on
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on 27 November at 10 AM at
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Sardar Club Scheme. opp. Polo Ground, Jodhpur, Rajasthan

Prof. (Dr.) Santanu Chaudhury

Director, IIT Jodhpur
Chief Guest

Er. Ravindra Kumar

Director, DRDO Jodhpur
Presiding Guest

Dr. S.K. Calla

Ex-CMD, RRVNL, Council Member, IE(I)
Guest of Honour

Dr. Rajesh Bhadada
Coordinator

Dr. Kailash Chaudhary
Co-Coordinator

Dr. Akhil Ranjan Garg
Chairman, IEI, JLC

Dr. Ghanshyam Vaishnav
Secretary, IEI, JLC

Inaugural function will be followed by lunch
Please follow COVID-19 guidelines
Kindily occupy your seat by 9:45 AM



JAI NARAIN VYAS UNIVERSITY JODHPUR
(DEPARTMENT OF RAJASTHANI)

No.JNVU/Raj/2021/ 923

Dated : 28-12-2021

Mr. Neeraj Goswami
Senior Manager-U.S. Program
United States- India Educational Foundation
(USIEF)
Fulbright House, 12 Hailey Road
New Delhi- 110 001

Subject : Certificate of Affiliation for U.S. Fulbright-Nehru Student Researcher
(Ms. Mrinalini Watson)

Sir,

This is with reference to letter dated 09th December, 2021 from Ms. Priyanjana Ghosh, Senior Program Officer, US-India Education Foundation, 12 Heiley Road, New Delhi addressed to the Vice-Chancellor, Jai Narain Vyas University, Jodhpur regard subject cited above.

Please find attached a Certificate of Affiliation duly signed by the Hon'ble Vice-Chancellor for further necessary action.

Yours Sincerely

(Dr. Meenakshi Borana)

Head
Department of Rajasthani
जयनारायण व्यास विश्वविद्यालय
जोधपुर

Enclosed : Affiliation Certificate

**CERTIFICATE OF AFFILIATION
for U.S. Fulbright-Nehru Student Researcher**

Name of the Scholar: **Mrinalini Watson**

Subject Area: **Linguistics**

U.S. University/Institution: **California State University, California, USA**

Title of Research Project: ***"Cinderella in Rajasthan: Folktales, Tools for Fostering Mutual Understanding."***

(To be filled in by the affiliating institution)

This is to certify that Mrinalini Watson, U.S. Fulbright-Nehru researcher shall be affiliated as a student in the **Jai Narain Vyas University, Jodhpur (Rajasthan)** upon arrival in India. The scholar will be assisted by **Dr. Meenakshi Borana** of the **Department of Rajasthani**, who will act as the student's academic supervisor. The scholar is required to pursue the above course of research as part of his/her research at the U.S. institution mentioned above. The scholar's expenses in India will be met by the Fulbright-Nehru grant, awarded by the United States – India Educational Foundation, and there will be no financial obligation on the affiliating institution.

Details of the academic supervisor, nominated for the U.S. Fulbright-Nehru Student:


Name: **Dr. Meenakshi Borana**

Designation: **Head & Asstt. Professor**

Contact Address: **Deptt. of Rajasthani, Language Wing, New Campus , Bhagat ki Kothi, Jodhpur (Rajasthan)- 342001**

Telephone Number(s): **Office_02912721746 Home : 9509477255**

Email: **boranadrmeenakshi@gmail.com**


Vice-Chancellor
Jai Narain Vyas University
JODHPUR.

(Signature and Official seal of Certifying Authority)**

**Head of the Institution/Vice Chancellor/Registrar of the University

The Affiliation Certificate may kindly be sent in original with signatures and official stamp to:

Mr. Neeraj Goswami
Senior Manager - U.S. Program
United States – India Educational Foundation (USIEF)
Fulbright House, 12 Hailey Road
New Delhi – 110 001
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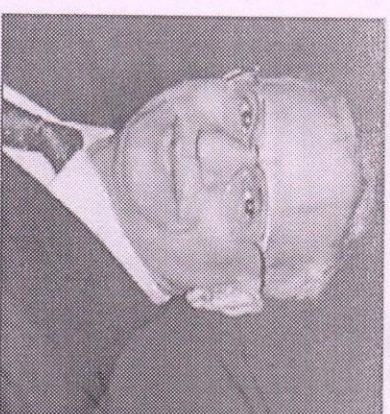
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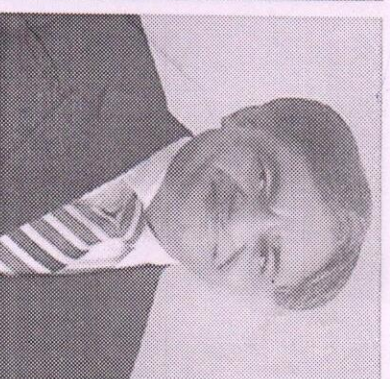
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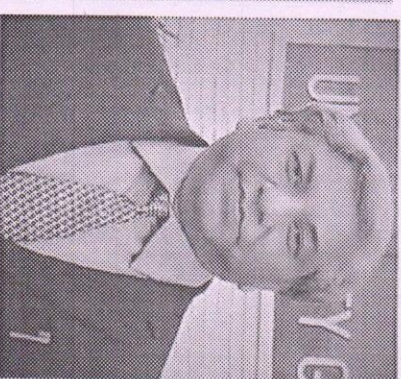
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