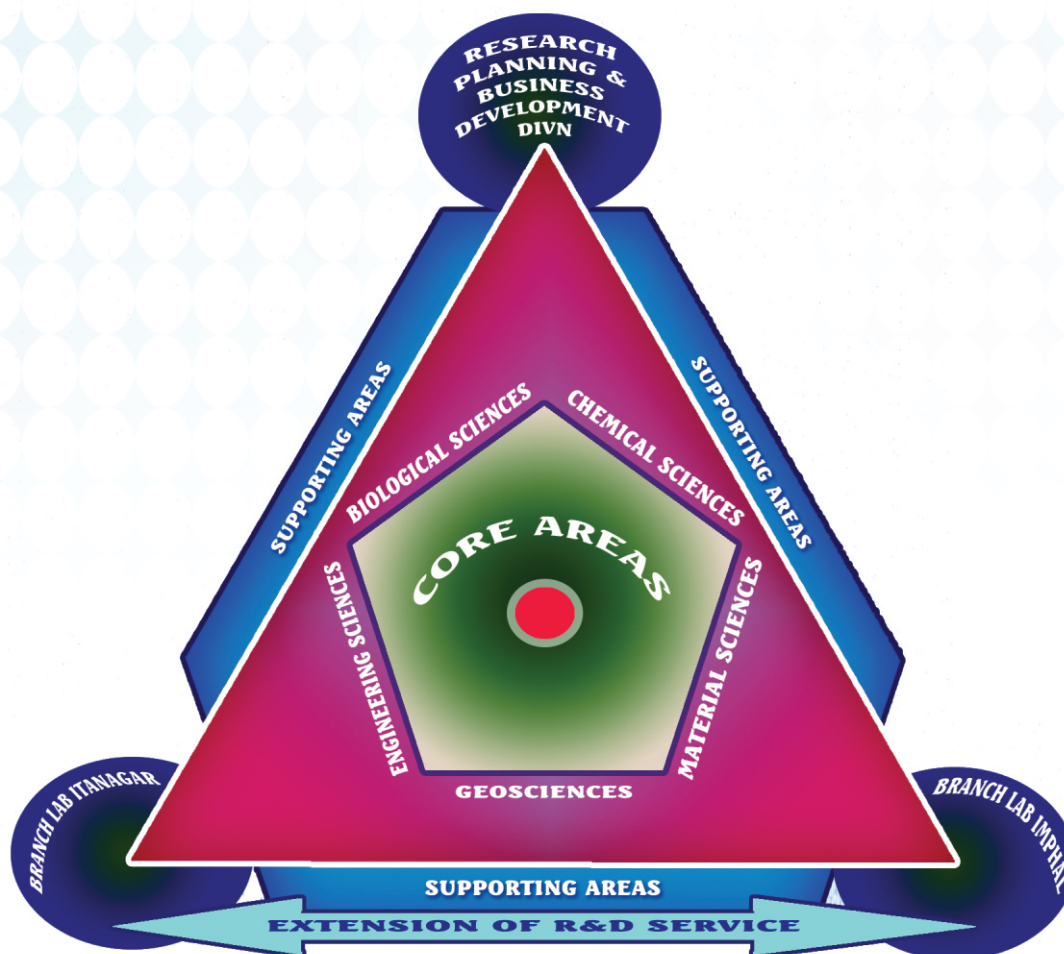


वार्षिक प्रतिवेदन ANNUAL REPORT 2016-2017



सीएसआईआर-उत्तर पूर्व विज्ञान तथा प्रौद्योगिकी संस्थान, जोरहाट
CSIR-NORTH EAST INSTITUTE OF SCIENCE & TECHNOLOGY, JORHAT



QUALITY POLICY OF CSIR-NEIST

CSIR-North East Institute of Science & Technology, Jorhat is committed to achieve excellence with quality outputs in R&D in frontier areas, professional consultancy and contract services in Chemical, Biology and Allied Sciences to be offered to customers in public and private domains at national and international levels.

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About CSIR-NEIST, Jorhat



CSIR-North East Institute of Science and Technology (Formerly Regional Research Laboratory) Jorhat, Assam was established in 1961 under the aegis of Council of Scientific & Industrial Research (CSIR), New Delhi as one of the multidisciplinary CSIR laboratories. The constituent laboratories of CSIR are grouped into five broad areas such as Physical Sciences, Chemical Sciences, Biological Sciences, Engineering Sciences and Information Sciences depending upon the type of work, objective and the nature of responsibilities vested on these laboratories. On this basis, CSIR-NEIST is one among the seven laboratories under the Chemical Science group. Being the first and foremost R&D Institute in North East India, CSIR-NEIST has been engaged in multidisciplinary R&D activities contributing to the industrial growth and economic prosperity of the region as well as the country. The major thrust of R&D activities of CSIR-NEIST has been to develop indigenous technologies and knowledge base by utilizing the immense natural wealth of the North Eastern region of India. The North Eastern region of the country being bestowed with an abundance of material resources like petroleum, natural gas, minerals, tea and aromatic and medicinal plants, the laboratory was assigned to undertake research for development of expertise and know-how for a wide range of industries and extension works.

In accordance with the charter, goal and objectives, the Institute has focused its R&D mainly on five broad areas, viz., (i) Biological Science, (ii) Chemical Science, (iii) Engineering Science, (iv) Geo Science, and (v) Materials Science. The Institute has branch laboratories at Itanagar, Arunachal Pradesh and Imphal, Manipur which are involved in extension activities and locality based R&D works. The Institute has developed expertise in the areas like natural products chemistry, drugs and drug intermediates, VSK cement technology, agro-technologies, petrochemicals, crude-oil transportations, paper and paper products, beneficiation chemicals, ecology and environment studies, geotechnical investigations, foundation design engineering, soil investigation and building materials including testing & analyses. Over the years, the Institute has generated more than 120 technologies and

developed expertise in those five broad areas of which a large number, specially Micro, Small and Medium (MSM) technologies were commercial successes culminating in setting up of various industries throughout the country. On the basis of the technologies developed, CSIR-NEIST bagged CSIR-Technology Award continuously for four years from 2010 to 2013, besides several awards received by the scientists of the Institute.

Some major accolades received by CSIR-NEIST are (1) FICCI Award in the year 1982 & 1985 for development of technologies and rural development activities; (2) NRDC Awards for development of process technologies in the year 1972, 1984 & 1985; (3) SIDC Award in 1987; (4) Industrial Promotion Board Award in 1988; and (5) CSIR Technology Awards for four consecutive years from 2010 to 2013.

The Institute has also earned its name by rendering quality testing/analysis services for various samples like water, soil, fertilizers, building materials, cement, iron & steel, stones, oil & petroleum products, coal, minerals, fibres, paper, boards, natural products, etc. The major beneficiaries of these services include industries, entrepreneurs, private and public enterprises, researchers, students and others.

The Institute is committed to focus and design its activities at different point of time in accordance with the national commitments and priorities. The Institute also has tie-up with other research and academic institutions for functional and other co-ordinations for HRD and S&T developments of the region in particular and the country as a whole. Efforts are being made to further evolve the Institute as a leading S&T player in the present global scenario.

From the Director's Desk



It gives me immense pleasure to present before you the Annual Report of CSIR-North East Institute of Science & Technology for the year 2016-17. The report is the snapshot of our Institute's activities, achievements and the progress we have made over the last year in the field of science and technology. I thank all my colleagues and staff members for working together as a team and accomplishing the tasks that came in hand.

During the year, five (5) new technologies namely 'Modular bricks from Brahmaputra River Sand', 'Herbal Mosquito Repellent Wax Candle', 'High yielding variety of Citronella (Jor Lab C-5)', 'High yielding variety of Lemongrass (Jor Lab L-8)' and 'a Membrane Technology for Extraction and Separation of Oxyresveratrol' were developed. With an effort to build close linkage with other organizations, the institute has taken up some consultancy assignments and transferred our technologies to some of the best industries which helped in earning sizable cash resources. The know-how on 'Herbal Anti-Arthritis formulation' was transferred to three reputed Pharmaceutical companies of India such as M/s Kudos Laboratories, New Delhi, M/s Altis Life Sciences, Himachal Pradesh and M/s Multani Pharmaceutical Ltd, New Delhi for commercial production. In addition to that M/s DSP Agro-foods & Chemical Industries, Bhubaneswar acquired four CSIR-NEIST technologies namely Wood-Care Formulations, Solid Deodorant & Freshner, Liquid Deodorant & Cleaner and Herbal Mosquito Repellent Wax Candles for commercial production. The product, with name 'V1 Jointment', has been successfully commercialized in the market by the client, Kudos Laboratories, New Delhi. On the publication side, the Institute published a total of 124 papers in reputed journals with an average impact factor of 2.952. On the IPR front, 4 Patents were granted in India, while 10 patents were filed in India & abroad.

The Institute was also honoured by the visit of many dignitaries such as Padma Shri Prof Goverdhan Mehta, FNA, FRS, President of International Union of Pure and Applied Chemistry on Foundation Day during 24-26 September, 2016, Bharat Ratna Professor C N R Rao on 21 December, 2016, Dr Ch Mohan Rao, Former Director, CSIR-Centre for Cellular & Molecular Biology, Hyderabad on 11 May, 2016 and

Padma Bhushan Dr T Ramasami, Former Secretary, Department of Science & Technology and former DG-CSIR on 20 March, 2017. The dignitaries delivered their lectures and held discussions with our R&D Scientists which has been a truly learning and motivating experience for us.

This year, the CSIR Foundation Day carried a special significance as it marked the beginning of the year-long Platinum Jubilee celebration of the organization. The Institute also celebrated the day with a 3-day program at its premise during 24-26 September, 2016 in tune with the main CSIR Platinum Jubilee Foundation Day program held at Vigyan Bhawan, New Delhi. The event at Vigyan Bhawan was graced by Shri Narendra Modi, Hon'ble Prime Minister of India & President, CSIR. Commemorating the occasion, Hon'ble PM released 7 new plant varieties developed by CSIR labs to the nation which included the improved varieties of Citronella (Jor-Lab C-5) and Lemon grass (Jor-Lab L8) developed by CSIR-NEIST. Further he interacted with progressive farmers assembled in five different locations across the country through live telecast by Doordarshan. CSIR-NEIST also organised a one-day outreach program as a precursor to the 2nd India International Science Festival at CSIR-NEIST on 22 November, 2016. The program was attended by 175 students guided by their 17 teachers, besides grass root innovators, entrepreneurs and members from various NGOs.

It is indeed a proud privilege to mention that some of our staff members have received prestigious awards in recognition of their contribution in various fields of Science, viz., the prestigious 'National Academy of Sciences, India (NASI) Young Scientist Platinum Jubilee Award-2017' awarded to Dr Ram Awatar Maurya, Scientist, 'R P Bhatnagar Award 2015-16' to Dr B K Saikia, Scientist, 'Bharat Gaurav Award 2016' & 'Distinguished Scientist Award to Dr H B Singh Principal Scientist & Scientist-in-Charge, CSIR-NEIST Branch Laboratory, Imphal and 'Prof. R C Tripathy Memorial award' to Dr Pitambar Patel, Scientist. Mr Ajay Kumar, Hindi Officer has been awarded for outstanding performance in the field of official language implementation by the Department of Official Language under the Union Ministry of Home Affairs. Moreover Miss Puspa Das and Miss Himadri Das received runners up award in 'Carrom Women Doubles' in 48th SSBMT finals held at CSIR-CIPAM, Lucknow.

The Institute continued to render its services to the people of the region through various programs and activities. On the societal front, the Institute along with its branch laboratories in Imphal (Manipur) and Itanagar (Arunachal Pradesh) imparted training and demonstration of its low cost technologies like Mushroom cultivation, Vermicompost cultivation and cultivation of Medicinal & Aromatic Plants to the rural masses to provide them avenues for earning livelihood. The programs under human resource development have been significant with an increased no. of students, who enrolled for Ph D programs under AcSIR and other universities of the region and outside.

I sincerely acknowledge the constant support, guidance and encouragement received from Director General, CSIR, Research Council & Management Council and also thank once again each and every member of the Institute for their sincere contributions, hard work and dedication in the overall achievements and progress of the Institute.

A handwritten signature in black ink, appearing to read 'D Ramaiah', is placed above the name and title.

(D Ramaiah)
Director, CSIR-NEIST

25 September, 2017

निदेशक के डेस्क से



वर्ष 2016-17 के लिए सीएसआईआर-उत्तर पूर्व विज्ञान तथा प्रौद्योगिकी संस्थान की वार्षिक रिपोर्ट पेश करते हुए मुझे बहुत खुशी हो रही है। यह रिपोर्ट हमारे संस्थान की गतिविधियों, उपलब्धियों और प्रगति का सारांश है जो हमने पिछले वर्ष विज्ञान और प्रौद्योगिकी के क्षेत्र में किया है। मैं अपने सभी सहयोगियों और कर्मचारियों के सदस्यों को टीम के रूप में एक साथ काम करने और हाथ में आने वाले कार्यों को पूरा करने के लिए धन्यवाद देता हूँ।

वर्ष के दौरान, पांच (5) नई प्रौद्योगिकियाँ, अर्थात् 'ब्रह्मपुत्र नदी के रेत से माँड्यूलर ईटें', 'हर्बल मॉस्किटो रोधी मोम मोमबत्ती', 'सिट्रोनेला की उच्च उपज वाली किस्म (जोर लैब सी -5)', 'उच्च उपज देने वाली किस्म लेमनग्रास (जोर लैब एल -8) 'और' ऑक्सिसवेरटरोल के पृथक्करण और पृथक्करण के लिए एक झिल्ली प्रौद्योगिकी 'विकसित किया गया। अन्य प्रतिष्ठित संगठनों के साथ समन्वय बनाने की एक कोशिश के साथ, संस्थान ने कुछ परामर्शी कार्य भी किया है। हमारी कुछ प्रौद्योगिकियों को बेहतरीन उद्योगों में स्थानांतरित किया है जो बड़े पैमाने पर नकदी संसाधनों की कमाई करने में मदद कर रहे हैं। 'हर्बल एंटी-आर्थराइटिस फॉर्म्युलेशन' पर वाणिज्यिक उत्पादन के लिए भारत के तीन प्रतिष्ठित फार्मास्युटिकल कंपनियों जैसे मेसर्स कुडोस लेबोरेटरीज, नई दिल्ली, मेसर्स के अल्टिस लाइफ साइंसेज, हिमाचल प्रदेश और मेसर्स मुल्तानी फार्मास्युटिकल, लिमिटेड, नई दिल्ली ने प्राप्त किया है। इसके साथ ही मेसर्स डीएसपी एग्रो-फूड एंड केमिकल इंडस्ट्रीज, भुवनेश्वर ने वाणिज्यिक उत्पादन के लिए सीएसआईआर-निस्ट के चार प्रौद्योगिकियों जैसे वुड-केयर फॉर्म्युलेशन, सॉलिड डिओडोरेंट एंड फ्रेशनर, लिक्विड ड्यूडोरेंट एंड क्लीनर और हर्बल मच्छर रोधी मोम मोमबत्तियाँ का अधिग्रहण किया। एंटी-आर्थराइटिस फॉर्म्युलेशन को उत्पाद नाम 'वी 1 जॉइंटमेंट' के रूप में मेसर्स कुडोस लेबोरेटरीज, नई दिल्ली ने सफलतापूर्वक बाजार में उपलब्ध किया है।

प्रकाशन क्षेत्र में, संस्थान ने 2.952 के औसत इंपैक्ट फैक्टर के साथ प्रतिष्ठित पत्रिकाओं में कुल 124 शोध पत्र प्रकाशित किए हैं। अंतर्राष्ट्रीय पेटेंट अधिकार मोर्चे पर, भारत में 4 पेटेंट ग्रांट करा लिए गए, जबकि 10 पेटेंट भारत और विदेश में दर्ज किए गए हैं।

वर्ष के दौरान गणमान्य व्यक्तियों का संस्थान में आगमन हुआ हम उनके आगमन से सम्मानित हुए। स्थापना दिवस के अवसर 24-26 सितंबर, 2016 के दौरान पद्मश्री प्रोफेसर गोवर्धन मेहता, एफएनए, एफआरएस, अध्यक्ष इंटरनेशनल यूनियन फॉर प्यूर एण्ड एप्लाइड कैमिस्ट्री का आगमन, 21 दिसम्बर को भारत रत्न के प्रोफेसर सीएनआर राव का आगमन, 11 मई 2016 को सीएसआईआर-सेल्यूलर और आण्विक जीवविज्ञान, हैदराबाद के पूर्व निदेशक डॉ सी मोहन राव का आगमन, 20 मार्च 2017 को पद्म भूषण डॉ टी रामासामी, पूर्व सचिव, विज्ञान और प्रौद्योगिकी विभाग और पूर्व डीजी-सीएसआईआर का आगमन हुआ। इनहोंने अपना व्याख्यान रखा एवं हमारे अनुसंधान एवं विकास से जुड़े वैज्ञानिकों के साथ विचार-विमर्श किया जो हमारे लिए वास्तव में सीखने और प्रेरित करने वाला अनुभव रहा है।

इस वर्ष, सीएसआईआर स्थापना दिवस का विशेष महत्व है क्योंकि संगठन के प्लेटिनम जयंती उत्सव के वार्षिक आयोजन की शुरुआत

है। संगठन मुख्यालय द्वारा विज्ञान भवन, नई दिल्ली में आयोजित सीएसआईआर प्लेटिनम जयंती फाउंडेशन दिवस कार्यक्रम मनाया गया, साथ-साथ 24-26 सितंबर, 2016 के दौरान निस्ट परिसर में भी 3 दिवसीय कार्यक्रम मनाया गया। विज्ञान भवन के कार्यक्रम में भारत के माननीय प्रधानमंत्री एवं अध्यक्ष, सीएसआईआर श्री नरेंद्र मोदी उपस्थित थे। इस अवसर पर माननीय प्रधानमंत्री ने सीएसआईआर प्रयोगशालाओं द्वारा देश में विकसित 7 नई किस्मों के पौधे को जारी किया जिसमें सीआईएसआर-निस्ट द्वारा विकसित सीट्रोनेला (जोर-लैब सी-5) और लेमन घास (जोर-लैब एल 8) की बेहतर किस्मों को शामिल किया गया। इसके अलावा, उन्होंने दूरदर्शन द्वारा लाइव प्रसारण के माध्यम से पूरे देश के पांच अलग-अलग स्थानों में एकत्रित प्रगतिशील किसानों के साथ बातचीत की। सीएसआईआर-निस्ट ने 22 नवंबर, 2016 को अपने परिसर में द्वितीय भारतीय अंतर्राष्ट्रीय विज्ञान महोत्सव के अंतर्गत एक-दिवसीय आउटरीच कार्यक्रम का आयोजन किया। इस कार्यक्रम में 17 शिक्षकों द्वारा निर्देशित 175 विद्यार्थियों ने भाग लिया, इसके अलावा ग्रास रूट स्तर के आविष्कारकों, उद्यमियों और विभिन्न गैर सरकारी संगठनों के सदस्यों ने भाग लिया।

वास्तव में यह गौरवपूर्ण वर्ष रहा है क्योंकि हमारे कुछ स्टाफ-सदस्यों को विज्ञान के शोध में उनके योगदान को मान्यता देते हुए सम्मानित किया गया, जैसे डॉ राम अवतार मोर्य, वैज्ञानिक को प्रतिष्ठित 'नेशनल एकेडमी ऑफ साइंसेस, भारत (एनएसआई) युवा वैज्ञानिक प्लेटिनम जयंती पुरस्कार प्राप्त हुए हैं- डॉ बी.के. सैकिया, वैज्ञानिक को 'आरपी भटनागर पुरस्कार 2015-16' से सम्मानित किया गया, डॉ एच बी सिंह, प्रमुख वैज्ञानिक एवं वैज्ञानिक-इन-चार्ज सीएसआईआर-निस्ट शाखा प्रयोगशाला, इफाल को भारत गौरव पुरस्कार 2016 से सम्मानित किया गया, डॉ पितांबर पटेल, वैज्ञानिक को 'प्रो आर सी त्रिपाठी स्मारक पुरस्कार से सम्मानित किया गया एवं केंद्रीय गृह मंत्रालय के अधीन राजभाषा विभाग द्वारा राजभाषा कार्यान्वयन के क्षेत्र में उत्कृष्ट प्रदर्शन के लिए श्री अजय कुमार, हिंदी अधिकारी को सम्मानित किया गया। सुश्री पुष्पा दास और सुश्री हिमाद्री दास ने सीएसआईआर-सीआईपीएम, लखनऊ में आयोजित 48 वें एसएसबीएमटी फाइनल में 'केरम महिला डबल्स' में उपविजेता पुरस्कार प्राप्त किया।

संस्थान ने विभिन्न कार्यक्रमों और गतिविधियों के माध्यम से पूर्वोत्तर क्षेत्र के लोगों को अपनी सेवाएं प्रदान करना जारी रखा है। सामाजिक मोर्चे पर, ग्रामीण जनता के आजीविका की कमाई के लिए इम्फाल (मणिपुर) और इटानगर (अरुणाचल प्रदेश) में अपनी शाखा प्रयोगशालाओं के साथ संस्थान ने अपनी कम लागत वाली तकनीकों जैसे मशरूम की खेती, वर्मीकंपोस्ट की खेती और ग्रामीण इलाकों में औषधीय और सुगंधित पौधों की खेती का कार्यक्रमों के माध्यम से प्रशिक्षण और प्रदर्शन किया। मानव संसाधन संसाधन विकास के तहद महत्वपूर्ण वृद्धि दर्ज की गई, काफी संख्या में छात्रों ने एसीएसआईआर के तहद एवं अन्य विश्वविद्यालयों के अंतर्गत पीएचडी के लिए नामांकित किया।

मैं माननीय महानिदेशक, सीएसआईआर, अनुसंधान परिषद एवं प्रबंध परिषद का शुक्रिया अदा करना चाहता हूँ जिनसे निरंतर समर्थन, मार्गदर्शन और प्रोत्साहन मिलता रहा साथ ही संस्थान की प्रत्येक सदस्य को एक बार फिर धन्यवाद देता हूँ जिनके कठिन मेहनत, सक्रिय योगदान एवं समर्पण के बल पर समग्र उपलब्धियां और प्रगति संभव हो सका।



(डी रामाय्या)
निदेशक, सीएसआईआर-निस्ट

26 सितंबर, 2017

CSIR-NEIST AT A GLANCE 2016-2017

RESOURCE BASE

Infrastructural

R&D Divisions	05
Branch Laboratories	02
Seismic Stations	27

HUMAN RESOURCES

Total S&T Staff	219
Scientists	73
Technical Officers/Assistants	53
Support Staff (Technicians/ Lab. Attendants/Assistants)	93
Administrative Staff	76
Total Staff	295

FINANCIAL

	(Rs in Lakhs)
Government Allocation	7212.780
From Contract R&D and Consultancy	529.660
Testing/ Analytical Services	30.209
Miscellaneous including Royalty/ Premia	1.164

BUDGET

	Sanctioned (Rs in Lakhs)
Recurring	3602.800
Capital	1871.400
Network Project (task force)	
Capital	497.500
Recurring	1241.078

R&D PERFORMANCE: 2016-2017

Knowledge Generation

Papers published	124
International Peer Reviewed Journals	103
National Peer Reviewed Journals	12
Book Chapters	07
Proceedings	02
Average IF	2.952
Highest IF	9.125

Technological Output

Processes Developed	05
Processes Released to Industries	05

Extramural & Human Resource Development

DST Woman Scientist Scheme	01
Research Associate, DBT	01
Sr Research Fellows	12
Jr Research Fellows	18
CSIR-TWAS Fellows	04
DST Inspire Faculty	01
Young Scientist Scheme	03
DBT Ramalingaswami Fellow	01
DST Ramanujan Fellow	01
National Post Doctoral Fellows (NPDF)	02
Guest Workers	06
Project Fellows	157

Patents Filed

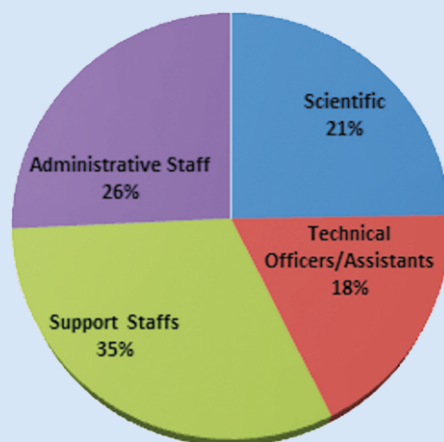
In India & Abroad	10
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Patents Granted

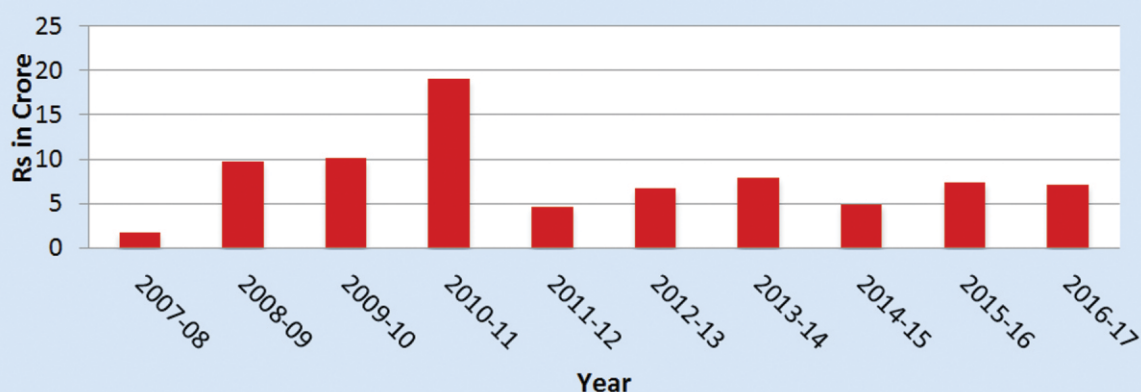
In India & Abroad	04
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PERFORMANCE INDICATOR

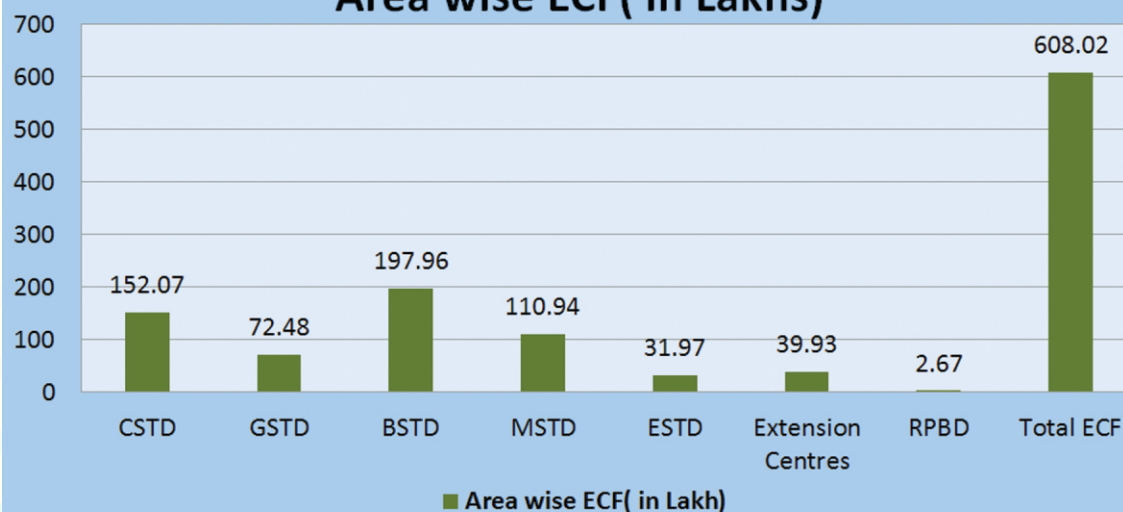
Human Resource: 2016-2017



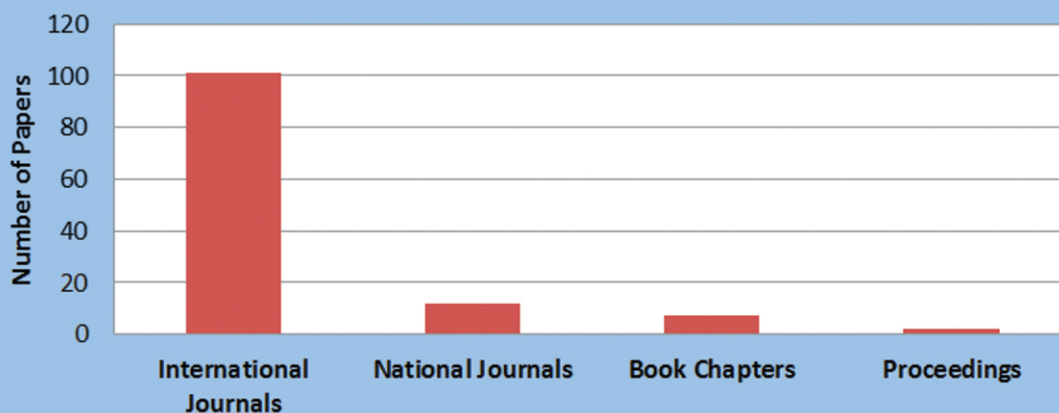
External Cash Flow (2007-2017)



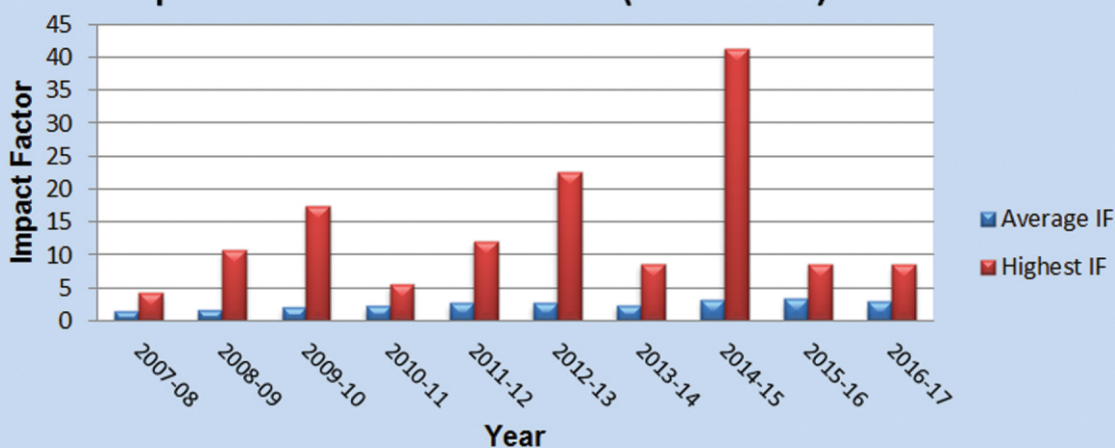
Area wise ECF(in Lakhs)



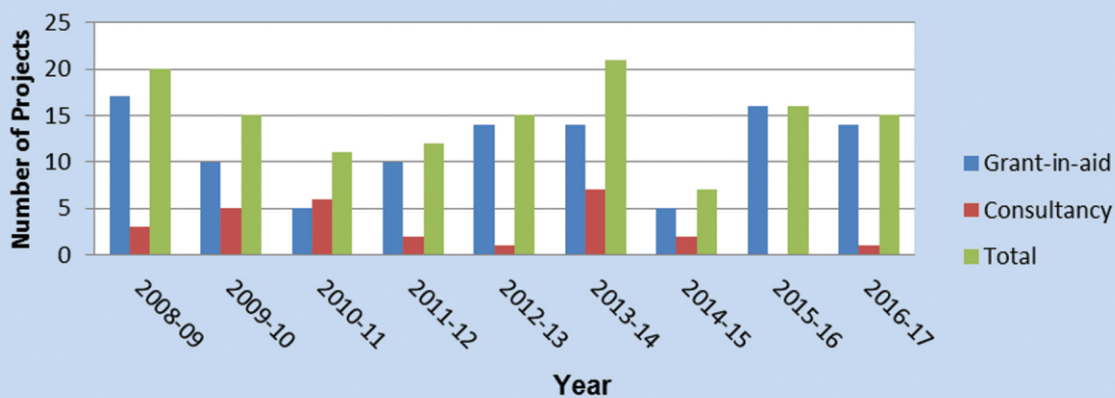
Papers Published: 2016-2017



Impact Factors of Publications (2007-2017)



Funded Projects Completed (2007-2017)



MEMBERS OF RESEARCH COUNCIL 2016-2017



Prof Harsh K Gupta,
Member, NDMA, New Delhi
Chairman



Prof H R Wason, Emeritus
Fellow, IIT, Roorkee
External Member



Prof Samir Bhattacharyya,
Former Director,
CSIR-IICB, Kolkata
External Member



Prof BB Dhar,
Former Director,
CSIR-CIMFR
External Member



Shri Ashoke Kumar Dutta,
North East Council
Member



K. C. Gupta, Former Director
Indian Institute of Toxicology
Research (IITR), Lucknow
Sister Laboratory



Head or his nominee, PPD,
CSIR, New Delhi



Prof B K Konwar, V C
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External Member



Prof Kankan Bhattacharyya,
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V C, University of Mysore,
External Member



Dr P K Biswas, Former
Advisor (S & T), Planning
Commission
External Member



Dr A Ajayghosh, Outstanding
Scientist, CSIR –NIIST
Thiruvananthapuram
DG's Nominee



Dr. Suresh Das, Director
CSIR –NIIST
Thiruvananthapuram
Cluster Director



Dr D Ramaiah, Director,
CSIR-NEIST, Jorhat
Director



Permanent Invitee

MEMBERS OF MANAGEMENT COUNCIL

2016-2017



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CSIR-NEIST, Jorhat
Chairman**



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CSIR-Central Drug Research
Institute, Lucknow
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**Dr Sanjay Kumar, Director
CSIR-ISBT, Palampur
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**Mrs Alokanda Sengupta
Sr Principal Scientist
CSIR-NEIST
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Scientist, CSIR-NEIST
Member**



**DR H P Dekabaruah
Principal Scientist
CSIR-NEIST**



**Shri Tapas Das
Senior Scientist
CSIR-NEIST
Member**

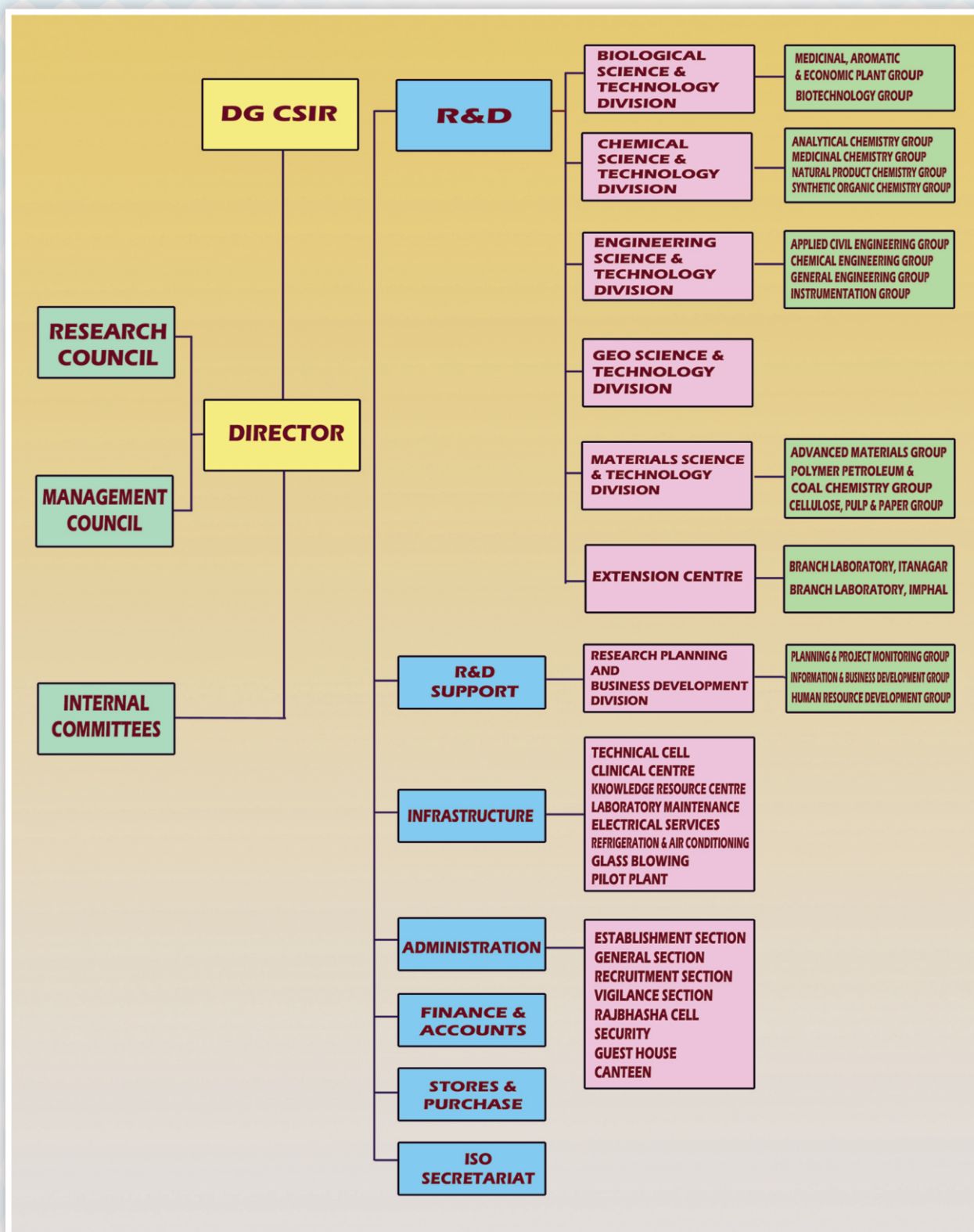


**Shri Rama Shankar Sharma
Finance and Accounts Officer
CSIR-NEIST
Member**



**Shri Vikram Singh
Administrative Officer
CSIR-NEIST
Member - Secretary**

ORGANIZATIONAL STRUCTURE



GLIMPSES OF 2016-17

Achievements

Sl.No	Title	Achieved
1	External Cash Flow (ECF)	Rs. 608.02 Lakhs
2	Publications	124 Nos
3	Patents	10 Nos (Filed in India & Abroad) 4 Nos (Granted in India & Abroad)
4	Technologies/Process Know-hows developed	5 Nos
5	Technologies/Process Know-hows transferred	5 Nos

Technologies/Processes Developed

Sl.No	Technology/Process Know-how
1	High yielding variety of Citronella (Jor Lab C-5)
2	High yielding variety of Lemongrass (Jor Lab L-8)
3	Herbal Mosquito Repellent Candle
4	Technology for extraction and purification of Oxyresveratrol
5	Modular Brick from Brahmaputra River Bed Sand

Technologies/Processes Transferred

Sl.No	Technology/Process Know-how	Party Name
1	Herbal Anti-Arthritis Formulation	M/s Kudos Laboratories India, New Delhi M/s Multani Pharma Ltd, New Delhi M/s Altis Life Sciences, Himachal Pradesh
2	Liquid Deodorant cleaner Technology	M/s DSP Agrofoods & Chemical Industries,
3	Wood Care Formulation	Bhubaneswar
4	Herbal Mosquito Repellent Wax candle	
5	Solid Deodorant cleaner Technology	

Commercial Success of Herbal Anti-Arthritis Formulation

The product, with name V1 Jointment, has been successfully commercialized in the market by the client, Kudos Laboratories, New Delhi. With aggressive marketing and publicity, the product has a pan-India presence today reaching out to people throughout the country and also outside through various online websites such as www.amazon.in, www.ebay.in, www.snapdeal.com, www.indiamart.com, etc



DOUBLE BLIND HUMAN CLINICAL TESTED RESEARCH PRODUCT

V-1[®] JointmentTM

INSTANT RELIEF FROM ALL JOINT PAIN 90g

ANTI ARTHRITIS OINTMENT

A Breakthrough Invention by **CSIR-NEIST**
Council of Scientific & Industrial Research-
North-East Institute of Science & Technology

MINISTRY OF SCIENCE & TECHNOLOGY

& Catalysed by
National Research Development Corporation

NRDC to KUDOS LABORATORIES INDIA

100 years of Experience in Ayurveda

CSIR Platinum Jubilee Foundation Day

The Institute celebrated the Foundation Day with a 3-day program at its premise during 24-26 September, 2016.



Open Day Students Visit on 24 Sept, 2017



Padma Shri Prof Goverdhan Mehta's visit during 24-26 Sept, 2016



Glimpses of 'Kisan Mela' on 26 Sept, 2016

Fellowships

Sl.No	Fellowship	Awardee(s)	Contributuions
1	Fellow of the Prestigious "National Academy of Sciences (NASI)", India,	Dr D Ramaiah, Director, CSIR-NEIST	Contributions in synthesizing NIR absorbing squarines, porphyrins, chlorins and aza- BODIPY dyes for studying these as sensitizers and photodynamic therapeutical (PDT) applications.

Awards

Sl.No	Awards	Awardee(s)
1	Bharat Gaurav Award 2016	Dr H B Singh, Principal Scientist & Scientist-in-Charge, CSIR-NEIST Branch Laboratory, Imphal
2	Prof. R. C. Tripathy Memorial award	Dr Pitambar Patel, Scientist, CSIR-NEIST
3	Dr R P Bhatnagar Award	Dr B K Saikia, Scientist, CSIR-NEIST
4	NASI Young Scientist Platinum Jubilee Award-2017	Dr Ram Awatar Maurya, Scientist, CSIR-NEIST
5	Official Language Implementation Award	Mr Ajay Kumar, Hindi Officer, CSIR -NEIST
6	SSBMT Carron Women Doubles Runners Up Award	Miss Puspa Das, Technician(1), CSIR-NEIST Miss Himadri Das, Project Fellow, CSIR NEIST

Notable Visitors to CSIR-NEIST



Visitor: Dr Ch Mohan Rao
Visitor's Details: Former Director, CSIR-CCMB, Hyderabad
Date of Visit: 11 May, 2016, Technology Day
Lecture Delivered: "Science & Technology for Social Good"

Visitor: Padma Shri Prof Goverdhan Mehta
Visitor's Details: FNA, FRS, President of International Union of Pure and Applied Chemistry
Date of Visit: 24-26 September, 2016, 75th Foundation Day
Lecture Delivered: "Dimensionality of Chemistry: A Science for Global Sustainability in the 21st Century"



Visitor: Bharat Ratna Prof C N R Rao
Visitor's Details: National Research Professor, Linus Pauling Research Professor & Honorary President, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Date of Visit: 21 December, 2016
Lecture Delivered: "Photochemical and thermochemical splitting of water"

Visitor: Mr Srinivas Lanka
Visitor's Details: Thought leader in the field of Pharmaceuticals in India and mentor to various Industrialists, Corporate Boards and Government of India Initiatives
Date of Visit: 4-6 January, 2017
Lecture Delivered: "Linkage of Govt. and Industry to achieve health Indian Pharma"





Visitor: Padma Bhushan Dr T Ramasami

Visitor's Details: Former Secretary, Department of Science & Technology and former DG-CSIR

Date of Visit: 20 March, 2017, 56th CSIR-NEIST Foundation Day

Lecture Delivered: "Triple Helix of Excellence, Relevance and Sustenance"

CSIR-NEIST Publications with Impact Factor (IF) above 5

- ❖ Stabilized Fe_3O_4 magnetic nanoparticles into nanopores of modified montmorillonite clay: a highly efficient catalyst for the BaeyerVilliger oxidation under solvent free conditions by Pallab Kumar Saikia, Lakshi Saikia, Kokil Saikia, Dipak Kumar Dutta, *Green Chemistry*, **2016**, *18*, 843-2850 (IF-9.125)
- ❖ Reduced graphene oxide nanosheets decorated with Au-Pd bimetallic alloy nanoparticles towards efficient photocatalytic degradation of phenolic compounds in water by G Darabdhara, P K Boruah, P Borthakur, N Hussain, M R Das, T Ahamad, S M Alshehri, V Malgras, Wu, K C W, Y Yamauchi, *Nanoscale*, **2016**, *08*, 8276-8287 (IF-7.760)
- ❖ Aluminum Titania Nanoparticle Composites as Nonprecious Catalysts for Efficient Electrochemical Generation of H_2 by Gitashree Darabdhara, A M Amin, Mersal Gaber A M, Emad M Ahmed, M R Das, Mohamed B Zakaria, Victor Malgras, Saad M Alshehri, Yusuke Yamauchi, Szunerits, Boukherroub Rabah, *ACS Applied Materials Interfaces*, **2016**, *8*, 23655-23667 (IF-7.145)
- ❖ Visible Light Driven Photocascade Catalysis: $\text{Ru}(\text{bpy})_3(\text{PF}_6)_2/\text{TBHP}$ -Mediated Synthesis of Fused β -Carbolines in Batch and Flow Microreactors by D Chandrasekhar, B Satheesh Orra, Jagadeesh Babu Nanubolu, Ram Awatar Maurya, *Organic Letters*, **2016**, *18*, 2974-2977 (IF-6.732)
- ❖ Coumarin to Isocoumarin: One-Pot Synthesis of 3-Substituted Isocoumarins from 4-Hydroxycoumarins and Benzyne Precursors by Kashmiri Neog, Dhiraj Dutta, Babulal Das, Pranjal Gogoi, *Organic Letters*, **2017**, *19*, p-730-733 (IF-6.732)
- ❖ The amide C-N bond of isatins as the directing group and the internal oxidant in Ru-catalyzed C-H activation and annulation reactions: Access to 8-amido isocoumarins by P P Kaishap, B Sarma, S Gogoi, *Chemical Communications*, **2016**, *52*, 9809-9812 (IF-6.567)
- ❖ Ru(II)-Catalyzed C-H activation and annulation of salicylaldehydes with monosubstituted and disubstituted alkynes Swagata Baruah, Partha Pratim Kaishap, Sanjib Gogoi, *Chemical Communications*, **2016**, *52*, 13004-13007 (IF-6.567)
- ❖ Synthesis of oxindole from acetanilide via Ir(III)-catalyzed C-H carbenoid functionalization by Pitambar Patel, Gongutri Borah, *Chemical Communications*, **2017** (IF-6.567)
- ❖ Inhibition of Mycobacterium tuberculosis dihydrodipicolinate synthase by alpha-ketopimelic acid and its other structural analogues by Priyanka Shrivastava, Vikas Navratna, Yumnam Silla, Rikeshwer P Dewangan, Pramanik Atreyi, Sarika Chaudhary, Geethavani Rayasam, Anuradha Kumar, Gopal Balasubramanian, Srinivasan Ramachandran, *Scientific Reports*, **2016**, 30827 (IF-5.228)
- ❖ Bis(3,5-diiodo-2,4,6-trihydroxyphenyl)squaraine photodynamic therapy disrupts redox homeostasis and induce mitochondria-mediated apoptosis in human breast cancer cells (Article), Babu P S Saneesh, P M Manu, T J Dhanya, P Tapas, R N Meera, A Surendran, K A Aneesh, S J Vadakkancheril, D Ramaiah, S A Nair, M R Pillai, *Scientific Reports*, **2017**, *7*, p-42126 (IF-5.228)

R&D Activities



BIOLOGICAL SCIENCES & TECHNOLOGY DIVISION

Biological Science & Technology Division (BSTD) is a multi-disciplinary division of CSIR-NEIST, Jorhat, which is dedicated for frontline research at the frontiers of modern biology research. With the highest standards of excellence in research, it ensures interdisciplinary partnerships that will transform the discoveries made through the dedicated study of basic biology into applied solutions to different challenges. The prime mission of the BSTD is to develop indigenous technologies from the enormous bio resources of North East India including plants, microbes and insects using modern tools & techniques of biotechnology.

Other major important activities of the division include environmental monitoring of pollutants, routine analysis of water, food & beverages and soil samples. Thus the division is actively engaged in both basic and applied research by highly experienced professional researchers in different frontier areas of biological sciences.

The division is poised to play an even greater role in defining national & global research initiatives in the areas of health, conservation of biodiversity and the environment through large-scale interdisciplinary collaborations with other divisions at CSIR-NEIST as well as the many research institutions. The division has a DBT-sponsored Bioinformatics Infrastructure Facility (BIF) and DBT sponsored Institutional Biotech Hub which provides training, workshops and caters to the need of researchers and students communities on genomics, proteomics, application to the development of drugs/ drug designing, anti-microbial agents, microbial taxonomic data analysis, mathematical modeling/data analysis, etc.

HIGHLIGHTS OF IMPORTANT WORK DONE DURING 2016-17

- ❖ Developed a bio formulation of Plant Growth Promoting Rhizobacteria (PGPR) using coir pith as carrier for imparting tolerance under osmotic stress conditions.
- ❖ Development of in vitro regeneration protocols for *Phoebe goalparensis* & Patchouli.
- ❖ DNA bar-coding of some selected medicinal & endemic plants of NE India. More than 400 barcoding sequences submitted to NCBI.
- ❖ More than 200 bacteria isolates were screened for biosurfactant production.
- ❖ Evaluated the anti-proliferative activities of vasicinone, an active molecule found in *Adhatoda vasica* plant against lung carcinoma cells.
- ❖ Organised one training-cum-workshop for student/faculty for bioinformatics training.

ACHIEVEMENTS OF THE DIVISION DURING 2016-17

- ❖ High yielding varieties of Citronelal and Lemongrass developed
- ❖ Herbal Mosquito Repellant Wax Candle technology developed.
- ❖ MOU signed for technology/knowhow transfer to NRDC, New Delhi, M/S Kudos Laboratories, New Delhi, M/S Altis Life Sciences and M/S Multani Pharmaceuticals Ltd. for Anti-Arthritis herbal formulation
- ❖ MOU signed for technology/knowhow transfer to M/s DSP Agrofoods & Chemical Industries, Bhubaneswar for 'Herbal Mosquito Repellant Wax Candle'.
- ❖ Detail evaluation of the microbes for in-situ conversion of contaminated pit water was performed for in situ bioremediation technology development.

- ❖ Seed samples of 90 unexploited tree borne oilseeds of NE India were screened of which 12 has been identified as leads for human consumption.

FUTURE PLANS OF THE DIVISION

- ❖ The CSIR-Aroma Mission has been launched to boost cultivation of aromatic crops like citronella, lemon grass and patchouli, keeping in view plight of farmers involved in traditional agriculture and their flight from rural areas due to climate change. Under the mission, cultivation of these crops will be promoted especially in unproductive, marginal waste lands including those affected by water scarcity, drought, salinity or flood in North Eastern states. The purpose is to boost cultivation and value-addition of aromatic plants for supply to industries related to aroma business and to the traditional system of Indian medicine. On the likely outcomes in the next three years, a minimum of 800 hectares of additional area in North Eastern states would be brought under cultivation of various aromatic crops generating employment among rural youth, and creating trained and skilled manpower leading to an estimated income enhancement of farmers.
- ❖ To develop herbal product for pain management.
- ❖ In situ bioremediation or eco restoration of oil contaminated soil.
- ❖ Development of plant based formulation for control of insect-pest of stored pulses & cereals.
- ❖ Development of multistress plant species of Tomato & cucumber using CAS-crisper technology.
- ❖ Modernisation of Bioinformatics infrastructure facility of the division.
- ❖ Process development and optimization for production of in-situ generated Vitamin D fortified mushrooms.
- ❖ To study the molecular phylogeny and bar coding of a traditionally known medicinal plant family of NER and their correlation with the naturally occurring phytochemicals. The chemical profiling of economically potential plants of NER will be studied and exploited for value added products.

A) National Collaboration

(I) Network Projects

Project Title: New initiative to boost agriculture productivity through maximizing pre- and post-harvest yields (AGROPATHY)

Project No: BSC 105

Funding Agency: CSIR, New Delhi

PI & Members: Dr Jatin Kalita (PI), Dr M Bhuyan, Mr T H Ahmed

Objective (CSIR-NEIST):

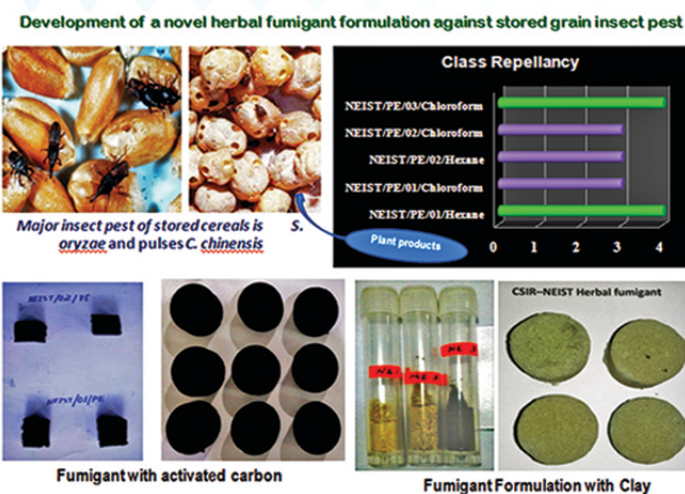
- ❖ Development of Plant based Formulations for control of insect-pest of stored pulses & cereals.
- ❖ Development of Economically & Environmentally sustainable strategies for the conversion of cereal & fruit processing by-products into new foods with ambitious market opportunities.
- ❖ Development of protocols for high value molecules for preparation of Nutraceuticals & Functional foods having antioxidant, anti-inflammatory and other organoleptic properties.

Salient Achievements:

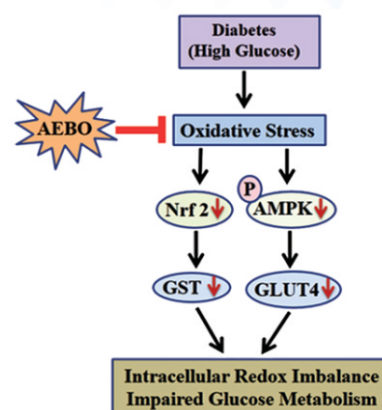
- ❖ Developed a novel herbal fumigant formulation with significant repellent properties against

stored grain insect pests in laboratory scale. Laboratory scale testing is completed and pilot scale production of the formulation and testing is in progress.

- ❖ A commonly available minor fruit of this region, *Spondias pinnata* has been evaluated for its phyto chemical composition, anti-microbial activity, anti-oxidant properties (DPPH radical scavenging activity, Hydroxyl radical scavenging activity; superoxide scavenging activity, Ferric Reducing Antioxidant Power, Phosphomolybdenum assay) and found to have significant anti-microbial and antioxidant properties.
- ❖ Evaluation of five edible insects for their nutritional and medicinal value i.e. Antioxidant, anti-inflammation, anti-diabetic and anti-cancer in cell free and cell culture model have been completed.



The Herbal Fumigant Formulation



Antioxidant and glucose metabolizing potential of hydro-alcoholic extract of *Brachytrupes orientalis*, an edible insect species of North East India

Project Title: Bioprospection of plant resources and other natural products

Project No: BSC-106

Funding Agency: CSIR, New Delhi

PI & Members: Dr B S Bhau (PI), Dr D Banik, Dr M Lal

Objectives:

- ❖ Bio resource exploration & mapping with emphasis to medicinal and aromatic plants
- ❖ Folklore inventories of plants for medicinal and aromatic value
- ❖ Identification of agro-based industry potentials of Medicinal & Aromatic plants
- ❖ DNA barcoding of selected medicinal and aromatic plants

Salient Achievements:

- ❖ The resource survey activities of Gibbon Wildlife Sanctuary, Jorhat, Assam and Nokrek Biosphere Reserve, Garo hills, Meghalaya resulted in collection, identification, compilation of ethnobotanical information, preparation of herbarium sheets and review of published literature of nearly 240 species under nearly 70 families used by the local and indigenous people to treat health ailments, other purposes and as source of vegetables. The plant species, their respective families, habits, useful plant parts, vernacular names, mode of administration

are recorded. Nearly 50 ethnomedicinal plant species are used to treat nearly 60 disease categories viz., as anti-cancer, anti-diabetic, anti-inflammatory, analgesic, stomach disorder, anti-arthritis, febrifuge, diuretic, dermal infection, neurological disease, anxiolytic, urinary disease as brain tonic, antioxidant etc. At least 10 numbers of species are used in each of the indications viz., Anti-cancer, Neurological, Stomach disorder, Anti-diabetic, Anxiolytic, Dermatological problems, Brain tonic and Antioxidants. The most common mode of administration is oral, followed by topical use and inhalation.

- ❖ Five samples of *Cinnamomum tamala* were barcoded using primer- ITS, rbcL 1F, rbcL 724r and trnH-psbA.
- ❖ High-quality genomic DNA was isolated from 15 samples of *Nepenthes khasiana*. The absorbance values at 260 nm/ 280 nm gave a ratio of 1.8 indicating good quality DNA.

Project Title: Plant Diversity: Studying adaptation biology and understanding/exploiting medicinally important plants for useful bioactives (SIMPLE)

Project No: BSC-109

Funding Agency: CSIR, New Delhi

PI & Members: Dr Hari Prasanna Deka Boruah (Nodal Scientist), Dr R Saikia, Dr J Kalita, Dr A K Singh

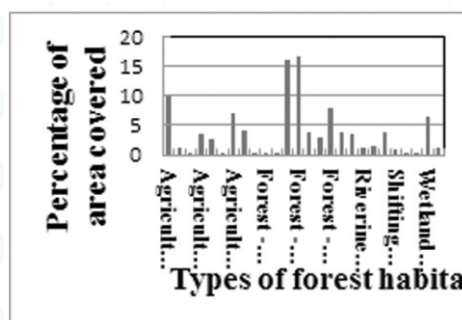
Objectives:

- ❖ Exploring plant diversity in different ecosystems of Assam and adaptation to abiotic stresses in plant species across and within ecological niche(s).
- ❖ Nature of microbial population, their dynamics to the environment and adaptation of plants.
- ❖ Studies on interaction/association of the three medicinally important plants (*Dracaena angustifolia*, *Abrus precatorius* and *Justicia adhatoda*) species in relation to biotic (microbes) and abiotic components.
- ❖ Dynamics of nutrients recycling in relation to three medicinal plant performance at different ecological niches

Salient Achievements:

- ❖ The Assam is located in the eastern most part of India between 24°.07// N to 28°.00// N Latitude and 89°.42// E to 96°.02// E Longitude and cover 78,438 sq. km. which is 2.39% of the country's total area. It is covered by 29,237 sq. km. of forest and tree which is 37.27% of the geographical area. The 4.98% of the geographical area is protected area includes 5 National Parks and 18 wildlife sanctuaries. According to their legal status, Reserved Forests constitute 66.58% and unclassified forests 33.42% of the total forest area. Altogether > 230 RF. Detail investigation were performed for the seven forest types, and habitats mapping using GIS satellite data found > 20 types of forest habitat in this seven studied forest, namely Poba, Kholahat, Uportala and Damra Reserved Forest, Dihing Patkai and Gibbon wild life sanctuary and Nameri National Park.

The entire studies forest the soils are acidic in nature (pH >5.0) with moderate microbial activities while soil types are sandy loam.



The Above ground biomass carbon (AGBC) was found to be 6.47 Mg ha⁻¹ to 11.76 Mg ha⁻¹ in the important families' value index trees.

Project Title: Introduction, domestication, improvement and cultivation of economically important plants (AGTEC)

Project No: BSC-110

Funding Agency: CSIR, New Delhi

PI & Members: Dr Mohan Lal (PI), Dr B S Bhau, Dr S P Saikia, Dr M Bhuyan

Salient Achievements:

- ❖ Collection, characterization and maintained of more than 350 germplasm of *Cymbopogon* species.
- ❖ Multi location trial of advances lines of *Cymbopogon*, Patchouli and *Kaempferia galanga* has been planted in four locations (Jorhat and Lakhmijan in Assam and Imphal in Manipur and Pasighat in Arunachal Pradesh) in North-East India.

Table: 1. Morphological and oil quality data of *Cymbopogon* species, Patchouli and *Kaempferia galanga* (Average of four Locations) one year (2016-17)

<u><i>Cymbopogon</i> species</u>						
Pedigree	Botanical name	Plant height	Tillers/Plant	Herbage yield tones/ha/year	Oil %	Major oil Constitute %
MI -657	<i>C. khasianus</i>	111.75	104.5	27.50	0.80	M. Eugenol 75
MI 530	<i>C. khasianus</i>	98	93	24.26	0.40	Elemicin 70
MI 43 -K-10-74	<i>C. flexuosus</i>	129	86	28.32	1.25	Citral 76
MI-Sel -1	<i>C. khasianus</i>	115	78	26.58	0.80	Geraniol 72
MI Hyb1K-1	<i>C. flexuosus</i>	126	45	22.94	0.51	Citral 91
Krishana (Check-1)	<i>C. flexuosus</i>	113.5	66	24.60	0.90	Citral 82
Jor Lab L - 2(Check 2)	<i>C. flexuosus</i>	125	42	26.80	0.44	Citral 81

Kaempferia galanga

Padigree	Botanical name	No. of primary rhizome	Dry rhizome recovery %	Fresh rhizome yield/tones/ha	Oil %	Total dry rhizome yield/tones/ha/year
Jor Lab K-1	<i>Kaempferia galanga</i>	13	28.50	6.70	2.31	2.35
Rajani Check variety	<i>Kaempferia galanga</i>	10	30.00	5.15	1.85	17.16

Patchouli

Pedigree	Botanical name	Plant height (cm)	Dry herbage yield kg/ha/year	Oil %	Oil yield kg/ha/year	Patchouli alcohol %
Jor Lab P-1	<i>Pongostemon cablin</i>	112	3220.0	3.10	80.50	38.0
Check Variety	<i>Pongostemon cablin</i>	101	2446.5	2.15	52.60	32.8



MLT on *Bixa orellana*

Results: The trial was planted in the year of 2014. On the basis of three year multi-locations data, the genotypes BO-1 showed maximum plant height (407.5 cm), branch/plant (49), plant diameter (1051 cm), No. of capsules per clump (14), Capsule clump /plant (49), No. of seed per capsule (32) and seed yield per plant (456 gm).

Project Title: Integrated nextgen approaches in health, disease and environmental toxicity (INDEPTH)

Project No: BSC-111

Funding Agency: CSIR, New Delhi

Nodal Lab: CSIR- IITR, Lucknow

PI & Members: Dr Ratul Saikia, Dr M Bhuyan, Dr J Kalita, Dr H P Deka Boruah

Objective:



Genetic diversity of bacteria isolated from environmentally degraded land of Assam.



To conduct surveys to identify different levels of pollutants in industrial and non industrial areas and correlate with aerial pollutants for documenting the impact of pollutants on butterflies.



Isolation and characterization purification of bio-molecules extra-cellular protein or other useful biomolecules from specific bacterial strain.

Salient Achievements:

I. In Environmental sector



Total bacterial diversity of areas surrounding Digboi oil Refinery was determined by Next-Gen sequencing (Illumina MiSeq Platform). The overall investigation depicted significantly distinct

- pattern with the abundance of 44 phylum, 123 classes, 222 families, 271 genus and 199 species; out of which *Gemmatimonadetes*, *Proteobacteria*, *WS3*, *Bacteroidetes*, *Acidobacteria*, *Nitrospirae*, *Actinobacteria*, *Chloroflexi* and *Firmicutes* were the most dominant phyla in all the sampling sites.
- ❖ Heavy metal concentration of different samples collected from the oil refinery was determined using atomic absorption spectrophotometer. Fe had the highest concentration whereas Mn was recorded as lowest concentration (0.04 mg/lit). Spearman co-relation studies predicted that the phyla *Chloroflexi* had a positive co-relation with Fe concentration. Therefore bacterial strain belonging to the phyla *Chloroflexi* can be used as a suitable bio-indicator.
 - ❖ More than 200 bacteria isolates were screened for biosurfactant production (**Fig below**). Out these isolates few promising isolates were identified based 16S rDNA sequence which were belonged to the genera *Bacillus*, *Pseudomonas*, *Paenibacillus*, *Alcaligenes* and *Clostridium*.

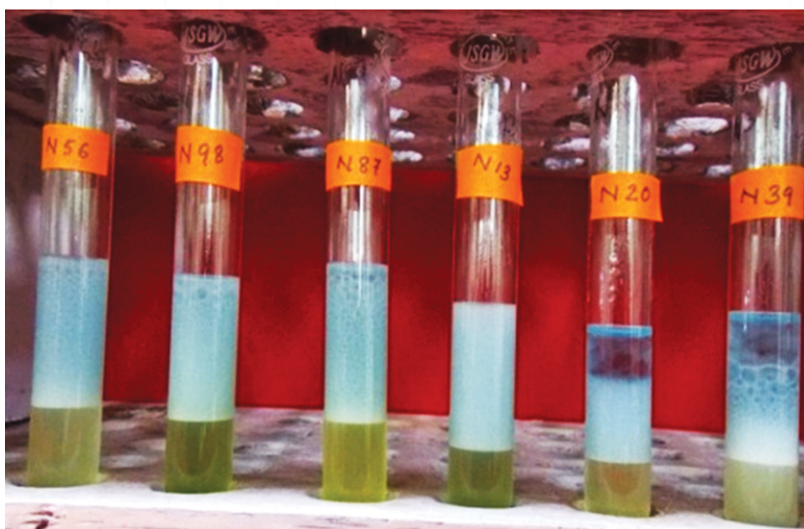


Fig. Emulsification index (E_{24}), here foam layer confirmed the biosurfactant production

- ❖ Air quality data like CO_2 , CO, SO_2 , Temperature and Relative humidity were recorded from three selected polluted sites in Assam i.e. ONGC Gas Gathering Station, Rudrasagar, Coal Field of Ledo (Margherita) and Nagaon Paper Mill, Jagiroad.
- ❖ Studied butterfly diversity and abundance around Gas flaring sites of petroleum industry (GGS I and GGS II) in Rudrasagar of Sibsagar district. Studied morphological, physiological parameters of a butterfly host plant i.e. *Cassia tora* from the field. It was observed that total chlorophyll content, leaf dry matter content (LDMC), nitrogen content of the host plant decreases and specific leaf area, leaf thickness, carbon content was found to increase in the study sites as well as under OTC than in control (unpolluted) (**Fig below**).

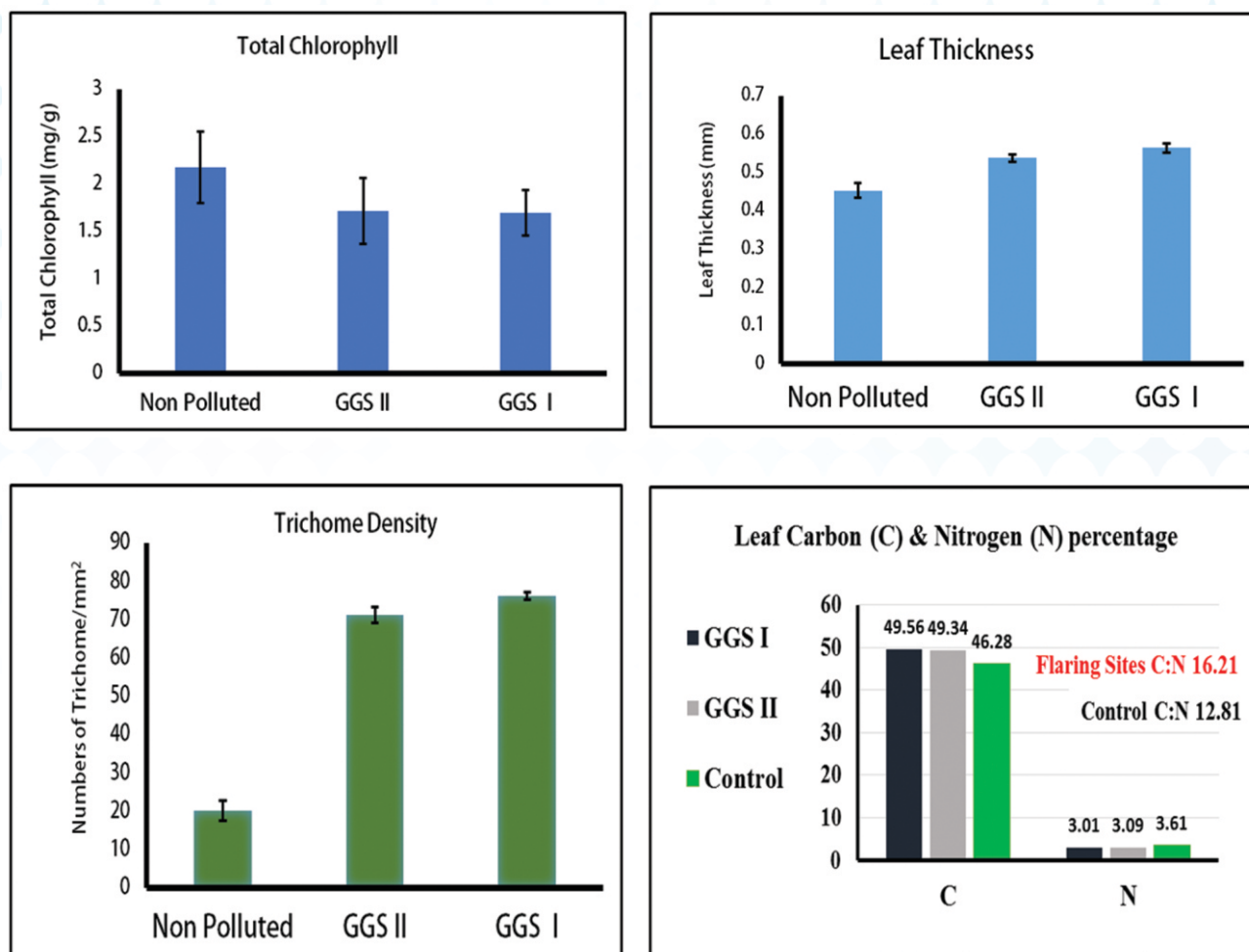


Fig. Total chlorophyll content, trichome density, leaf thickness & Leaf CN % of *Cassia tora* under elevated CO₂ and control (unpolluted).

II. In Health Sector

- ❖ Biochemical characterization of the bacterial strain having the coagulating property was performed. Minimal media required for Coagulase production by the bacterial strain was standardized. DNA was isolated and coagulase gene was amplified. The proteins showing clotting of plasma has been further purified to homogeneity. The active proteins having coagulase property is studied for individual amino acids composition by HPLC. Further process of purification & structure elucidation of this protein are in progress for immediate use in health care.
- ❖ Staphylocoagulase, a protein produced by *S. aureus*, play major role in blood coagulation and investigations are in advance to discover more staphylocoagulase producing species. The present study demonstrates the identification of a coagulase producing bacteria and isolation, purification and characterization of the protein. The bacteria was identified using 16s rDNA sequencing and phylogenetic investigation, classified the bacteria as *Staphylococcus* sp. MBBJP S43 with Genbank accession number KX907247. Tube test and Chromozym TH assay were used to study enzyme activity and comparison was made with five standard coagulase positive strains. The SEM images of the fibrin threads provide evidence of coagulation. The optimum

temperature for enzyme activity was 37°C and pH of 6.5-7.5. Glucose and lactose as a carbon source and ammonium chloride as nitrogen source greatly influenced the bacterial growth. Staphylocoagulase has been purified to homogeneity (766 fold) by 80% (NH₄)₂SO₄ precipitation, Sephadex G-75 gel filtration, DEAE anion exchange chromatography, and HPLC using C18 column. SDS PAGE revealed the molecular weight of the protein to be approximately 66 kD and FTIR spectra of the purified protein demonstrated the presence of α helical structure. Present study revealed that the *Staphylococcus* sp. MBBJP S43 strain is a potential staphylocoagulase producing bacteria. (Fig below).

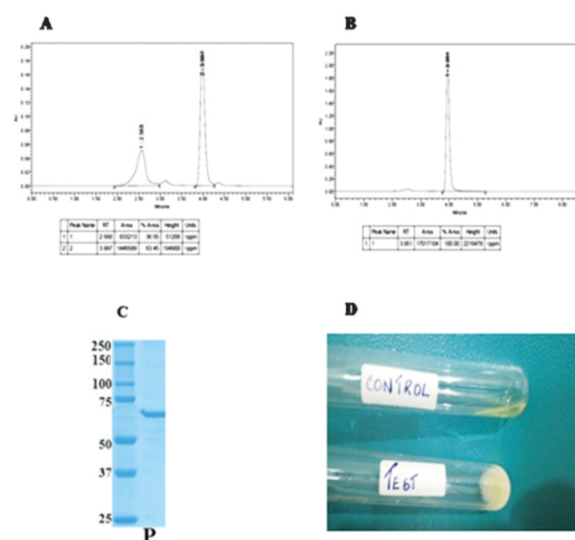


Fig: (A) HPLC chromatogram through C18 hydrophobic column (P1 and P2); (B) Rechromatography of the active peak material (P1); (C) SDS PAGE of the active peak material (P1). (D) Tube Coagulase test for confirmation of staphylocoagulase clotting assay using pure staphylocoagulase protein in sodium citrated blood plasma at 12 hour time point.

Project Title: Therapeutics of chronic obstructive pulmonary disease (COPD) and related respiratory disorders

Project No: BSC-116

Funding Agency: CSIR, New Delhi

PI & Members: Dr Jatin Kalita (PI), Dr H P Deka Boruah (Co-PI), Dr P K Baruah, Dr T Bora, Mr R C Bharali, Mr D Ozah

Objectives:

- ❖ To study the Sites around and near Open and Closed Coal Mines of Ledo, Assam and Meghalaya;
- ❖ To conduct Health Survey and Medical Camps, analysis of air around the coal mines, Clinical studies
- ❖ To study the genetic alteration in (GSTT1, GSTM1, α_1 – Antitrypsin, HMOX1) in Chronic Obstructive Pulmonary Disease (COPD) within the coal miners, COPD smokers, non-smokers and control.
- ❖ To analyse the statistical correlation of genetic alterations of the above genes, other parameters.

Salient Achievements:

- ❖ *Adhatoda vasica*, a traditional medicinal plant has been studied to find out its beneficial effect of plant extract on mRNA expression as well as protein expression of antioxidant enzyme machinery which may attenuate the naphthalene induced toxicity.

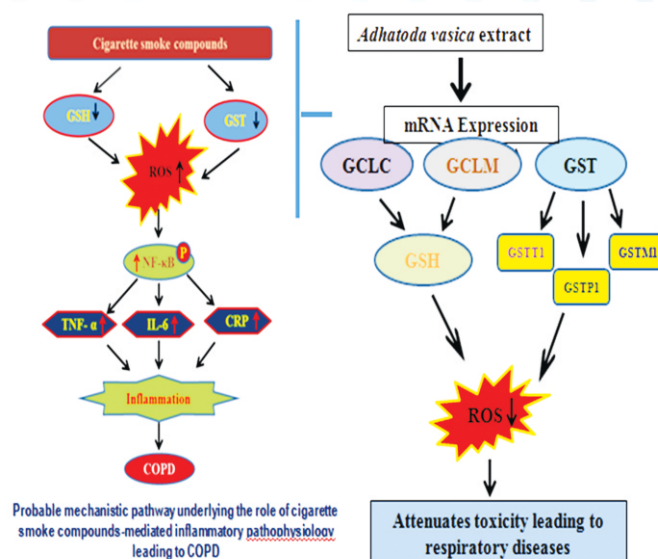


Fig. Mechanistic pathway underlying the role of cigarette smoke compounds-mediated inflammatory pathophysiology leading to COPD and use of plant products for attenuating toxicity

- ❖ Evaluated the anti-proliferative activities of vasicinone, an active molecule found in *Adhatoda vasica* plant against lung carcinoma cells. The study for the first time demonstrated the anti-proliferative potential besides antioxidant properties of the vasicinone, which may mediate the therapeutic activities in oxidative stress induced cancers.

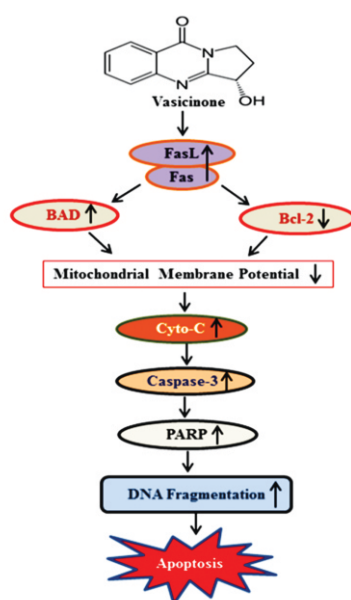


Fig. Probable mechanistic pathway of cellular signaling underlying the anti-proliferative role of vasicinone in lung carcinoma cells

- ❖ Occupational exposure plays a critical role for the development of COPD among genetically predisposed individuals. Higher concentrations of airborne heavy metals, like zinc, manganese, lead, cadmium, mercury and chromium were found in coal mine site of Jowai, Maghalaya compared to control site, Jorhat, Assam. Investigated the potential effect of individual heavy metals in alteration of cellular glutathione s transferase (GST) activity and reduced glutathione (GSH) level. It has been observed that with increasing level of heavy metals due to unscientific coal mining appears to be the risk factor for declining GST activity and GSH level, which may induce oxidative stress, leading to declined lung function and possibly causing the serious respiratory disorders like COPD. However, studies are further required to understand the detailed molecular mechanism underlying the role of individual heavy metals in the development of COPD.

Project Title: Role of ACC-deaminase producing bacteria on alleviation of water stress affect in pulse crops (RAWS)

Project No: BSC-117

Funding Agency: CSIR, New Delhi

PI & Members: Dr Ratul Saikia (PI), Dr H P Deka Boruah (Co-PI), Dr T C Bora (Co-PI), Mrs. A Yadav

Objectives:

- ❖ Isolation and screening of rhizobacteria for plant growth promotion with special reference to black gram.
- ❖ Genotyping and assessment of growth promoting traits in PGPR.
- ❖ Expression analysis of ACC- deaminase genes from PGPR.
- ❖ Role of ACC-deaminase producing bacteria for plant growth promotion under water stress condition.

Salient Achievements:

- ❖ Three strains, *O. pseudogrignonense* RJ12 (KM271984), *Pseudomonas* sp. RJ15 (KJ801950), *B. subtilis* RJ46 (KM083797) were selected based on their plant growth promoting attributes, vigor index, seed germination percentage and highest stability under osmotic stress conditions (-0.75MPa).
- ❖ The bacterial strains significantly increased total phenolics and proline contents in leaves compared to negative control (Fig below). Increase in leaf proline content is crucial for maintaining the osmotic potential of leaf tissues, which is an indicator to drought tolerance. Under this study, bacterization significantly increased free proline content in leaves as compared to uninoculated controls. Proline accumulation started increasing after 24 days under both stressed and unstressed conditions; it kept on increasing in stressed plants (both treated and non-treated) whereas the unstressed proline content in black gram leaves started to decline after 38 days. The trend in increased leaf proline contents in both the treated pulse crops was found to be similar. Similarly, total phenolic content in the bacterial inoculated plants increased significantly ($p > 0.05$) compared to control.