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Sustainable development key to tackling climate threats: V-P Dhankhar

CSIR-IIP

31st August , 2024

Sustainable development is the only way to deal with the challenges of climate change, biodiversity loss and resource depletion, Vice-President Jagdeep Dhankhar said on Saturday. Addressing scientists, faculty and students of CSIR-Indian Institute of Petroleum (IIP), Dhankhar said collaborative solutions were needed to address the challenges that threatened "our very existence".



"The challenges of today demand bold action and an institution like CSIR-IIP can serve as an effective platform for researching effective technologies that can help grapple with the challenges," Dhankhar said. The vice-president criticised people who were at one time in positions of authority and governance for "sub-serving partisan interests and floating anti-national narratives".

Dhankhar also condemned the observation that what was happening in the neighbouring country (Bangladesh) could happen in India as well.

"How can anyone who has faith in the vibrant and robust democracy of the country subscribe to such a view?" he asked.

He called upon youngsters not to let themselves be taken in by the false narrative and come forward to neutralise, rebuff and expose such forces. Earlier, the vice-president was received by Uttarakhand Governor Lt Gen (Retd) Gurmit Singh, Cabinet ministers Subodh Uniyal and

Premchand Aggarwal, and Haridwar MP Trivendra Singh Rawat as he arrived to the state with his wife Sudesh Dhankhar on a two-day visit. The vice-president and his wife also planted saplings in the memory of their respective mothers Kasari Devi and Bhagwati Devi on the CSIR-IIP campus.

IIT Kanpur Hosts BIS – Academia Workshop on Technical Advancements in Powder Metallurgical Processes & Products

CSIR-IMMT, CECRI

31st August , 2024

The Advanced Centre for Materials Science (ACMS) at the Indian Institute of Technology Kanpur (IITK) and the Bureau of Indian Standards (BIS), New Delhi, organized a BIS-Academia Workshop on ‘Technical Advancements and the Role of Standardization in Powder Metallurgical Processes and Products,’ in collaboration with the Department of Materials Science and Engineering at IIT Kanpur and the Indian Institute of Metals, Kanpur Chapter. The workshop brought together industry experts, academicians, and researchers to discuss the latest advancements and the critical role of standardization in powder metallurgy.

The workshop commenced with a welcome address by Prof. Anish Upadhyaya, Head of ACMS, IIT Kanpur, who also served as the workshop coordinator. Prof. Kantesh Balani, Head of the Materials Science and Engineering Department and Professor A.K. Singh, Faculty Incharge TechnoPark at IIT Kanpur, addressed the attendees, emphasizing the importance of continuous innovation and adherence to standards in advancing the field of powder metallurgy. Ms Swagat Bhandari, Nodal Incharge of the newly incepted Translational Research Initiative at IIT Kanpur provided her insights about the strategies to synergise the activities so as to ensure seamless translation of research or prototype stage to industrial adoption and production.

The morning session featured insightful presentations from representatives of leading industries. Mr. Mahesh Nipanikar, Technical Director at Hoganas India Ltd.; Mr. V. Sadafal and Mr. S. Biradar, Deputy General Managers at Emitec Technologies India Pvt Ltd.; and Mr. Rajesh Bhatia, CEO of RVB Shorelube Industry Pvt. Ltd., who shared their expertise and discussed the challenges and opportunities in the powder metallurgical processes sector. This session was followed by a tour of the ACMS facilities, offering participants a closer look at the cutting-edge research being conducted at IIT Kanpur. The afternoon session was marked by the 21st Technical Meeting of the Sectional Committee (MTD25) on Powder Metallurgical

Materials and Products. In the evening session, a series of six technical lectures that was attended by over 70 students, staff and faculty participants. The speakers included Mr. G. Ram Sai Kumar, Scientist-C and Deputy Director at the Metallurgical Engineering Department, BIS, opened the session with a lecture on the “Role of BIS and Standardization in Powder Metallurgy,” emphasizing the importance of standardization for maintaining consistent quality and supporting innovation in powder metallurgy. Dr. Mayadhar Debata, Senior Principal Scientist at CSIR-IMMT, Bhubaneswar, discussed the “Development of Non-Ferrous Alloys through Powder Metallurgy” with a special focus on strategic applications. The third lecture, by Dr. Pradyut Sengupta, Senior Scientist at CSIR-IMMT, focused on the “Design and Development of Intermetallics and Composites by Powder Metallurgy Route for High-Temperature Strategic Applications,” highlighting advanced materials for critical engineering challenges.

In the subsequent lecture, Dr. Gururaj Telasang, Scientist E, ARCI Hyderabad, delivered a talk on “Metal Additive Manufacturing: Materials, Processes, and Case Studies,” exploring innovative processes for engineering applications. Dr. Deepak Pattanayak, Principal Scientist at CSIR-CECRI, discussed the “Application of Metal Additive Manufacturing Technology in the Biomedical Field.” The workshop concluded with a presentation on “Frangible Bullets through Powder Metallurgy” by Prof. Anish Upadhyaya from IIT Kanpur and Anshu Bhatia, Managing Director at Camstar Defense India Pvt Ltd, focusing on the development of innovative, safety-enhanced ammunition through advanced powder metallurgical techniques.

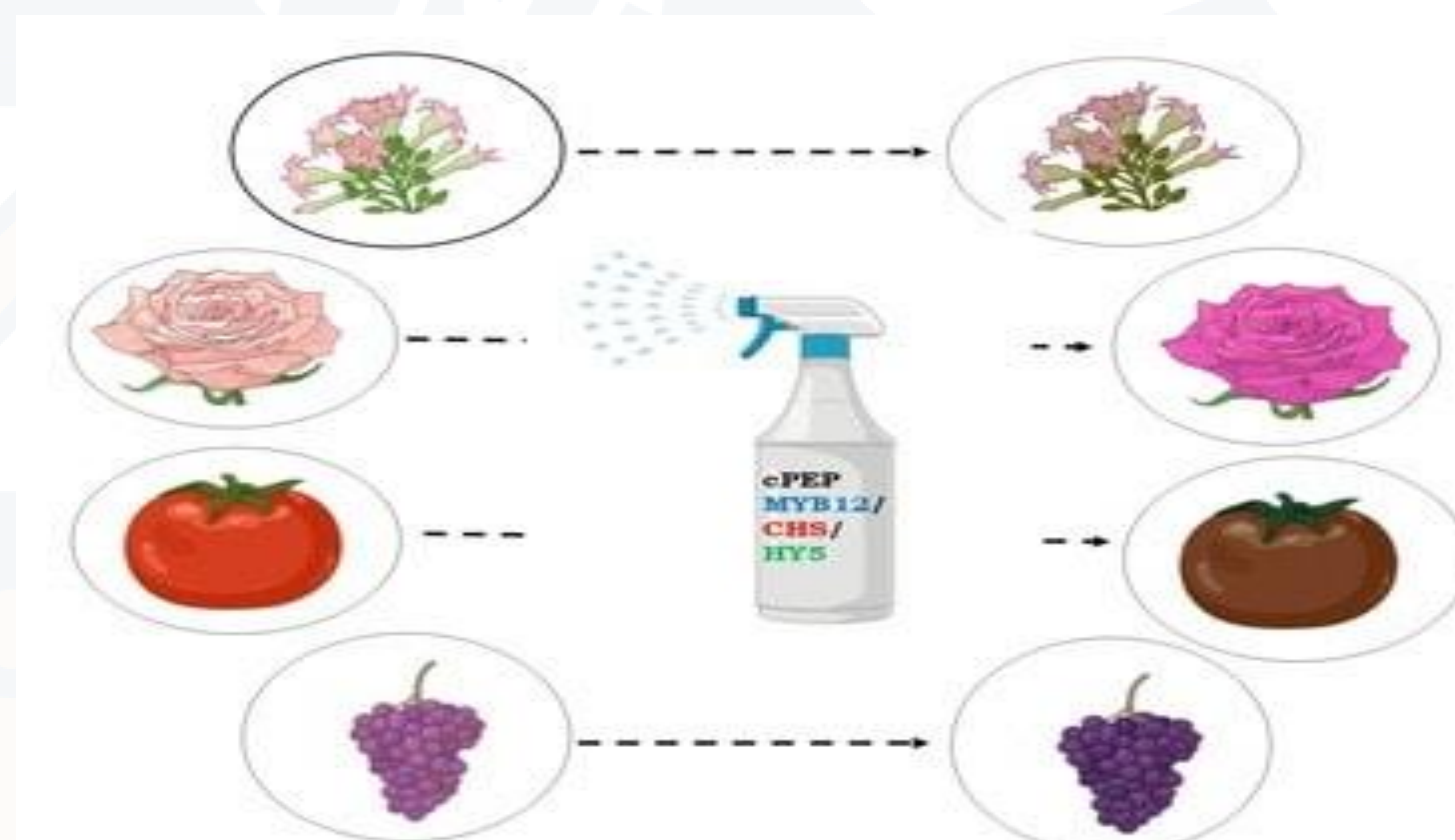
The day concluded with a vote of thanks, recognizing the contributions of all speakers and participants, and reaffirming the shared dedication of IIT Kanpur and BIS to advancing research and standardization in powder metallurgy.

CIMAP research finds new way to enhance nutritional quality of plants

CSIR-CIMAP

30th August , 2024

A recent research by scientists at the Council for Scientific and Industrial Research – Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP) has chanced upon ways to enhance the nutritional quality of plants. Till now , if scientists wanted to overexpress a gene in any plant, it had to be made a transgenic plant (one which is altered to achieve higher nutritional value) . However, due to certain regulations imposed by the food safety authorities across the world , the transgenic plants are not directly accessible to the farmers and consumers.



Now through the new research, the scientists have found that the nutritional quality of plants can be enhanced using ‘complementary peptides’ (complementary form of a short protein found in plants). As part of this research, complementary peptides, when sprayed on the plant, can enhance its nutritional value and properties.

“This will enhance the protein accumulation in a plant without making it transgenic. We have worked with three peptides (short proteins found in plants) for proof of the concept. We tested it on thale cress, rose, grapes, tobacco and tomatoes and found the synthesis of molecules including – anthocyanin, flavonols and lignin,” said a scientist Ashish Sharma.

Anthocyanin helps in prevention of inflammation, in protection against type II diabetes, cancer and heart disease. Flavonols have antioxidants, anti-cancer, anti-inflammatory and anti-viral properties while lignin is also rich in antioxidants and possesses anti-viral and anti-microbial properties.

“Thousands of peptides can be created from various proteins. If we know the function of a gene which we wish to enhance in a plant this technique can be used,” said Sharma.

Director CSIR-CIMAP, Prabodh Kumar Trivedi, who was also involved in the research, said that the technique could be used on any plant with more than 10 amino acids conserved in it for protein.

“The technique is useful for any type of stress borne by a plant, including abiotic stress like salt and drought and biotic stress like insects and pathogens. To validate this technology, the team sprayed complementary peptides on plants and mutant plants developed by the team. The gene is not functional in mutant plants, so the complementary peptides did not show any difference on them,” shared Trivedi.

When used on fruit plants like grapes and tomatoes, the nutritional values were found enhanced and when used on a white rose, there were certain changes in the colour of the flower. In tobacco, the levels of flavanols and anthocyanin were found to have increased.

“This can be a gamechanger for the plant industry. A patent has been filed for the research,” Trivedi added.

VP to interact with scientists, faculty members and students at CSIR-IIP, Dehradun

CSIR-IIP

30th August , 2024

The Vice-President of India, Shri Jagdeep Dhankhar will be on a two-day visit to Uttarakhand on August 31-September 01, 2024.

During his tour, Shri Dhankhar will interact with scientists, faculty members and students at CSIR-Indian Institute of Petroleum, Dehradun.

On the second day of his tour, Shri Dhankhar will visit Rashtriya Indian Military College, Dehradun. The Vice-President will also visit AIIMS Rishikesh, where he will interact with the students and faculty members of the institute.

पौधों की पोषण गुणवत्ता बढ़ाने का मिला तरीका, CSIR-CIMAP के वैज्ञानिकों ने किया शोध

CSIR-CIMAP

30th August , 2024

काउंसिल फॉर साइंटिफिक एंड इंडस्ट्रियल रिसर्च - सेंट्रल इंस्टीट्यूट ऑफ मेडिसिनल एंड एरोमैटिक प्लांट्स (CSIR-CIMAP) के वैज्ञानिकों द्वारा किए गए एक हालिया शोध में पौधों की पोषण गुणवत्ता को बढ़ाने के तरीकों का पता चला है। अभी तक वैज्ञानिक किसी पौधे में किसी जीन को अधिक अभिव्यक्त करना चाहते थे, तो उसे एक ट्रांसजेनिक पौधा (जिसे उच्च पोषण मूल्य प्राप्त करने के लिए बदल दिया जाता है) बनाना पड़ता था। हालांकि दुनिया भर में खाद्य सुरक्षा अधिकारियों द्वारा लगाए गए कुछ नियमों के कारण, ट्रांसजेनिक पौधे किसानों और उपभोक्ताओं के लिए सीधे उपलब्ध नहीं हैं। इस शोध के माध्यम से वैज्ञानिकों ने पाया है कि 'पूरक पेप्टाइड्स' (पौधों में पाए जाने वाले लघु प्रोटीन का पूरक रूप) का उपयोग करके पौधों की पोषण गुणवत्ता को बढ़ाया जा सकता है। इस शोध के एक भाग के रूप में, जब पूरक पेप्टाइड्स को पौधे पर छिड़काव किया गया, तो इसके पोषण मूल्य और गुणों में वृद्धि हुई।

शोध में सामने आई यह बातें

वैज्ञानिक आशीष शर्मा ने बताया कि यह पौधे को ट्रांसजेनिक बनाए बिना उसमें प्रोटीन संचय को बढ़ाएगा। हमने अवधारणा के प्रमाण के लिए तीन पेप्टाइड्स (पौधों में पाए जाने वाले छोटे प्रोटीन) के साथ काम किया है। हमने इसका परीक्षण थैले क्रेस, गुलाब, अंगूर, तंबाकू और टमाटर पर किया और एंथोसायनिन, फ्लेवोनोल्स और लिग्निन सहित अणुओं का संश्लेषण पाया। उन्होंने बताया कि एंथोसायनिन सूजन की रोकथाम, टाइप II मधुमेह, कैंसर और हृदय रोग से सुरक्षा में मदद करता है। फ्लेवोनोल्स में एंटीऑक्सिडेंट, कैंसर रोधी, सूजन रोधी और एंटी-वायरल गुण होते हैं जबकि लिग्निन भी एंटीऑक्सिडेंट से भरपूर होता है और इसमें एंटी वायरल और एंटी-माइक्रोबियल गुण होते हैं।

पौधे के तनाव में काफी उपयोगी

सीएसआईआर-सीमैप के निदेशक प्रबोध कुमार त्रिवेदी भी शोध में शामिल थे। कहा कि इस तकनीक का उपयोग किसी भी पौधे पर किया जा सकता है जिसमें प्रोटीन के लिए 10 से अधिक अमीनो एसिड संरक्षित हैं। उन्होंने बताया कि यह तकनीक किसी पौधे द्वारा उत्पन्न होने वाले किसी भी प्रकार के तनाव के लिए उपयोगी है, जिसमें नमक और सूखा जैसे अजैविक

तनाव और कीड़े और रोगजनकों जैसे जैविक तनाव शामिल हैं। इस तकनीक को मान्य करने के लिए, टीम ने पौधों और टीम द्वारा विकसित उत्परिवर्ती पौधों पर पूरक पेप्टाइड्स का छिड़काव किया। उत्परिवर्ती पौधों में जीन कार्यात्मक नहीं है, इसलिए पूरक पेप्टाइड्स ने उन पर कोई अंतर नहीं दिखाया।

Scientists link origins of Indian centipedes to ancient supercontinent Gondwana

CSIR-CCMB

30th August , 2024

Scientists at Hyderabad based Centre for Cellular and Molecular Biology (CCMB) found that the Indian scutigermorphs originated in Gondwana and continued to evolve within Peninsular India. They also believe that Australian biodiversity of Scutigermorpha is likely to have originated when the Indian ancestor dispersed from India within the last 100 million years.



They used specimens from across the Western Ghats and Eastern Ghats as well as a global dataset of genetic sequences. The tremendous species richness of the peninsular region of India, particularly within the Western and Eastern Ghats mountain chains have intrigued the researchers. This is even more so as the Peninsular Indian landmass is extremely old. It was part of the supercontinent Gondwana which consisted of present-day Africa, Antarctica, Australia and South America merged together approximately 200 million years ago. Eventually, Gondwana broke into parts and the Indian landmass drifted to its current position.

Where then, do all the organisms found in Peninsular India come from? This question bothered these scientists and took up the study on scutigermorphs.

Dr Jahnavi Joshi's lab at Centre for Cellular and Molecular Biology, Hyderabad sought to answer this question using one group of animals, Scutigermorpha. These are long-legged, fleet-footed centipedes often mistaken for spiders. Using specimens from across the Western Ghats and Eastern Ghats as well as a global dataset of genetic sequences, they found that the Indian scutigermorphs originated in Gondwana and continued to evolve within Peninsular

India. “This is fascinating, as most of India’s biodiversity has resulted from dispersal events into India from either from Asia or Africa across the last 65 million years. Only a few other burrowing animals have also been found to have Gondwanan lineages,” said Dr Joshi, Senior Scientist at CSIR-Centre for Cellular and Molecular Biology.

Furthermore, the current Australian biodiversity of Scutigeromorpha is likely to have originated when the Indian ancestor dispersed from India within the last 100 million years.

“Indo-Australian relationships are rare in the literature, likely because India and Australia were connected more than 130 million years ago - a date older than the origin of many studied taxa- and today are separated by thousands of kilometers of land and ocean,” said Maya Manivannan, the first author of the paper.

“Perhaps, the scutigeromorphs took ‘a passage through India’ from Gondwana all the way to Australia,” she added. This paper was published in the Journal of Biogeography.

Two-day retrofitting workshop in Kinnaur

CSIR-CBRI

29th August , 2024

A two-day sensitisation workshop on retrofitting of buildings commenced today at the ITDP building in Reckong Peo. The event is being organised by the District Disaster Management Authority in collaboration with CSIR-CBRI, Roorkee. The workshop was inaugurated by Assistant Commissioner Vijay Kumar.



Kumar said the event aimed to provide information to the departments concerned regarding the retrofitting of buildings in Kinnaur district. ASK Negi and Ashish Kapoor from CBRI, Roorkee, as the resource persons at the workshop, are conducting practical sessions on retrofitting techniques. On the first day of the event, Negi and Kapoor talked about the methods and tools used in retrofitting.

They explained how old structures and buildings could be revitalised using retrofitting equipment and machinery, thereby extending the lifespan of the buildings and ensuring the safety of occupants. The types of retrofitting discussed included techniques used for concrete structures, masonry structures, floors, roofs, tanks and pipelines.

The workshop was attended by officials of the Public Works Department, Jal Shakti Department, Health Department, Electricity Department, Police Department, District Development Office, revenue officers, officials from all three development blocks, and the naib-tehsildar of Sangla.

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EU, CSIR Announce Co-Funding To Foster EU-India Research Cooperation

CSIR

28th August , 2024

The European Union and the India's Council of Scientific and Industrial Research (CSIR) on Wednesday launched a new co-funding initiative for the Marie Skłodowska-Curie Actions (MSCA) Staff Exchanges, part of the EU's research and innovation programme, Horizon Europe. Through this scheme, CSIR will top up selected MSCA Staff Exchanges projects, enabling its institutes to engage in joint research projects with European and international partners and second their scientific and technical staff to European research organisations for knowledge sharing and research activities. This will promote a balanced researcher mobility and long-term collaborations.



The funding will be from 2025 to 2027 and be open to any CSIR institution involved in successful projects selected under the upcoming Staff Exchange calls. This new partnership will strengthen research and innovation ties between Europe and India and drive forward scientific and technological progress by enhancing bilateral institutional cooperation, collaborative research and researcher exchanges in a plurilateral setting under Horizon Europe.

Through its Staff Exchanges scheme, the MSCA promotes collaborative research, knowledge transfer and innovation by supporting the secondment of research and innovation staff within international consortia of organisations based in the EU, countries associated with Horizon Europe and third countries.

The next calls of Staff Exchanges will open on 19 September this year, with a deadline of 5

February 2025, and on 27 March 2025, with a deadline on 8 October 2025.

What is MSCA?

The Marie Skłodowska-Curie Actions under Horizon Europe is the reference programme for doctoral education and postdoctoral training. They support researchers across any career stage, as well as doctoral training and postdoctoral fellowship programmes and collaborative research in all domains.

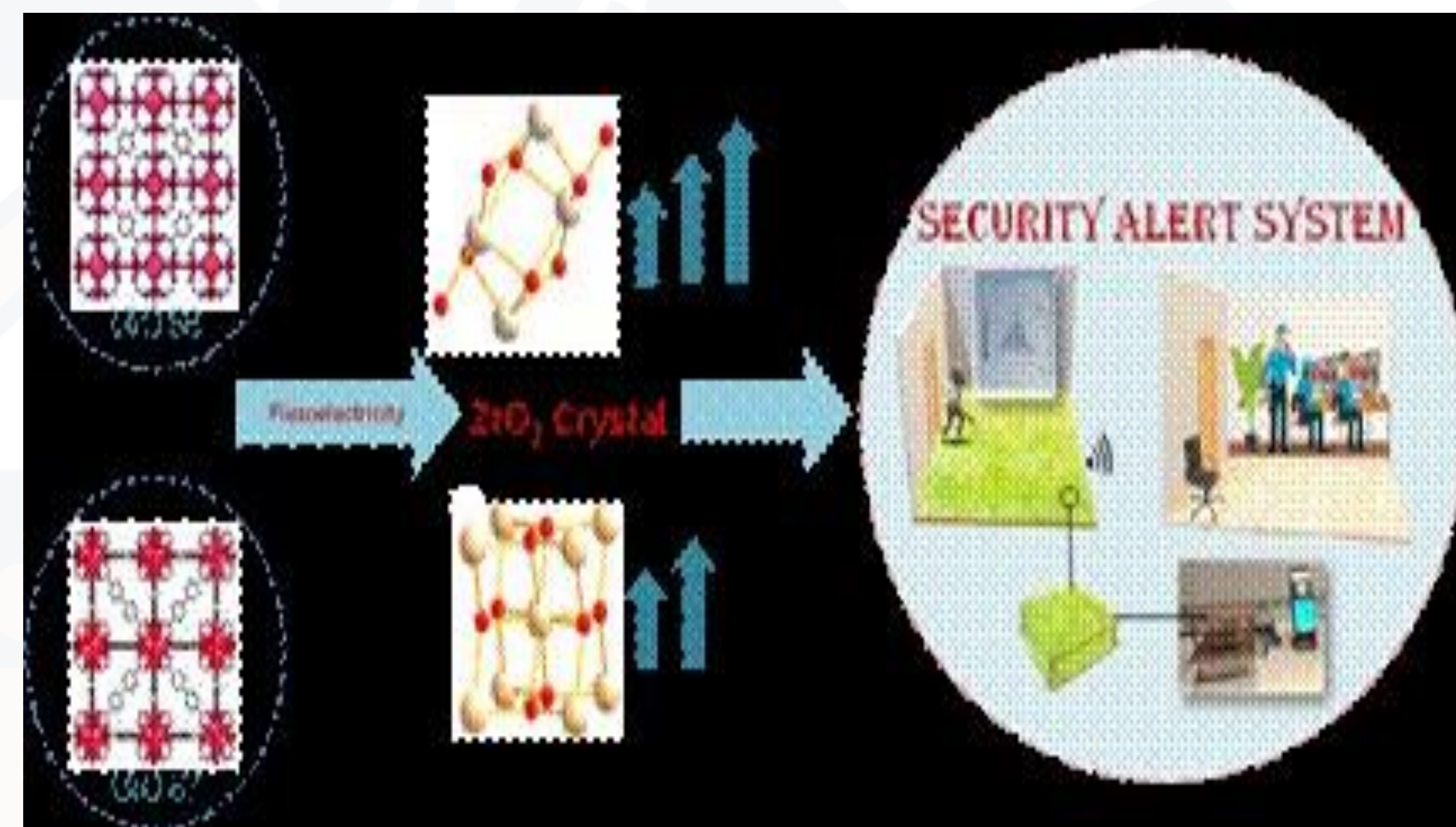
Since 2014, the MSCA has supported 182 research and innovation projects involving Indian organisations. India ranks first among non-European countries in participation of individual researchers, with over 2,800 Indian beneficiaries over the ten past years, including about 1,800 PhD candidates and 1,000 postdoctoral researchers.

Piezoelectric polymer nanocomposite developed can be used for energy harvesting

CSIR-NCL

28th August , 2024

A new piezoelectric polymer nanocomposite material developed can be useful for pressure sensing and energy harvesting applications. Researchers from Centre for Nano and Soft Matter Sciences (CeNS), an autonomous institute of Department of Science and Technology, in collaboration with scientists from National Chemical Laboratory (CSIR-NCL), Pune have developed a security alert system based on piezoelectric polymer nanocomposite. This development was based on the finding that metal oxide nanomaterials with appropriate crystal structure and surface properties when used as fillers in a polymer composite lead to a significant enhancement in the piezoelectric response.



In today's world, energy creation and harvesting from readily available sources is crucial. Mechanical energy is a plentiful and easily accessible source that can be transformed to electrical energy through a variety of techniques, including contact electrification/triboelectric effect and piezoelectric effect. Flexible, portable, sustainable, and wearable sensors and energy harvesting devices are critical nowadays. Polymers and nanoparticles are playing a major role in present flexible electronic systems.

A team of scientists from Centre for Nano and Soft Matter Sciences (CeNS), Bangalore, and the National Chemical Laboratory (CSIR-NCL), Pune have successfully prepared a polymer nanocomposite material for pressure sensing and energy harvesting applications. The researchers synthesized two zirconia-based metal-organic frameworks (UiO-66 and UiO-67) which were converted to zirconia nanoparticles with exquisite control over their

crystallographic phases namely monoclinic and tetragonal phases. Polymer nanocomposite films were then fabricated by incorporating these nanoparticles with different crystal structures into a well-known piezoelectric polymer, poly (vinylidene difluoride) (PVDF). The team of researchers evaluated the influence of varying crystal structures of zirconia nanoparticles on a piezoelectric energy-generating zirconia- PVDF composite and observed that the surface characteristics and crystal structure of the nanofillers have a significant impact in piezoelectric properties of polymer material.

Polymer nanocomposite with monoclinic zirconia nanoparticles produced from UiO-66 outperformed other derivatives and had greater piezoelectric output performance than pure polymer.

Furthermore, a laboratory-scale demonstration of a wireless, Bluetooth-based security alert system supported by an Android application was carried out, using the fabricated prototype as an energy-generating and security alert pavement unit.

The security pavement prototype was installed in a chamber. The piezoelectric pavement generated voltage due to footsteps (mechanical to electrical energy conversion), whenever an unwanted entry took place. This activated the security system, and the Bluetooth module sent the wireless communication to the concerned screen. In the system an android phone-based app was used to demonstrate this. Apart from a touch sensor the prototype can be also used for generating electrical energy from mechanical energy input.

This study validates the PVDF-monoclinic ZrO_2 nanoparticle nanocomposites will be an excellent value addition for flexible, durable energy generation and pressure-sensing applications. This work was recently published in American Chemical Society journal ACS-Applied Nano Material. This study is part of an ongoing project “Materials for self powered energy generating and pressure sensing devices” funded by Department of Science and Technology under Inspire –faculty fellowship programme.

The methodical investigation and crystal structure modifications will undoubtedly open the door to a better understanding of the mechanism underlying the piezoelectric capabilities of polymer nanocomposites based on PVDF.

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India edges past the UK in critical technologies research; IIT Bombay, Roorkee top performers

CSIR

28th August , 2024

India has edged past the United Kingdom by delivering more cutting-edge critical technology research during the period between 2019 and 2023, data published by the Australian Strategic Policy Institute on Wednesday (August 28) showed.

The institute updated its critical technology tracker this week by focusing on high-impact research or 10 per cent of the most highly cited papers, as a "leading indicator of a country's research performance, strategic intent, and potential future science and technology capability".

The tracker covers 64 critical technologies and crucial fields spanning defence, space, energy, the environment, artificial intelligence (AI), biotechnology, robotics, cyber, computing, advanced materials, and key quantum technology areas.

Critical technologies research: Top takeaways for India

1. India has edged past the United Kingdom in critical technologies research. It now ranks among the top five countries for 45 of 64 critical technologies against the UK's 36. For the period between 2018 and 2022, the UK was among the top five countries for 44 of 64 critical technologies while India was among the top five nations for 37 of 64 critical technologies. This represents enormous gains from 2003-2007 in which India was placed among the top five countries for only four technologies.

2. While more Indian research papers in critical technologies are being cited by researchers worldwide, overall, few India-based institutions appear in the top 20 rankings across any period between 2003-2023. But for the period between 2019 and 2023, two Indian institutions — Indian Institute of Technology Bombay (10) and Indian Institute of Technology Roorkee (14) — feature among the top 20 institutions for critical technology research. The rest of the institutions in the top 20 list are all based in China.

3. New Delhi-based Council of Scientific and Industrial Research is ranked fifth in the world as an institute with the highest quality research in Biofuels, the ASPI critical technology tracker showed.
4. When one considers the contribution of a particular institution in a single critical technology research area, India lacks standout institutional performers. Even though India is doing well at the national level (top 5 in 45 technologies), "the country's research expertise in critical technologies is highly fragmented", the ASPI report notes. "The lack of standout institutional performers may be limiting India's ability to attract foreign research talent and motivate prominent Indian scientists and technologists to stay at, or come back to, Indian institutions," the report notes further.
5. As a country, India finds it difficult to retain early-career critical technologies researchers who after leaving the country, go on to conduct high-impact research "primarily in the US and Europe", the data by ASPI talent tracker, which tracks the flow of global talent in these critical technologies, showed.
6. India has displaced the United States as the second-ranked country in two new technologies (biological manufacturing and distributed ledgers) to rank second in seven of 64 critical technologies.
7. The ASPI tracker showed that while India does not yet lead in any of the 64 critical technologies — only the United States and China lead in any of the 64 technologies — it still is a strong performer across a range of technologies, especially in biofuels and high-specification machining processes, "making major gains since 2019".
8. The report forecasts that India is poised to overtake China in its publication rate in biofuels within the next few years. "This is significant and would mark the only technology in which the lead country is not the United States or China," it added.

Published in:

[Wionews](https://www.wionews.com)

New Mutation in Saffron Gene Affects Plant Color, Growth, and Stress Resistance

CSIR-IIIM

28th August , 2024

Crocus sativus, commonly known as saffron, is renowned for its unique apocarotenoids such as crocin, picrocrocin, and safranal. These compounds are responsible for saffron's distinctive color, flavor, and aroma, making it a valuable crop. Enhancing the biosynthesis of these apocarotenoids can improve the quality of saffron and increase its resilience to changing climatic conditions. A recent study conducted by the CSIR Indian Institute of Integrative Medicine has made significant progress in this area by introducing a novel mutation in the stigma-specific lycopene- β -cyclase of *Crocus* (CstLcyB2a)[1].

Lycopene- β -cyclase is an enzyme that plays a crucial role in the carotenoid biosynthetic pathway. Carotenoids are pigments found in plants that are essential for photosynthesis and provide important nutrients to humans, such as vitamin A. In *Crocus sativus*, lycopene- β -cyclase converts lycopene into β -carotene, a precursor for the synthesis of apocarotenoids. The study introduced a mutation at position A126 in the CstLcyB2a enzyme, which sterically hinders its binding of δ -carotene without affecting lycopene binding. This mutation diverts the metabolic flux towards β -carotene formation, thereby enhancing the production of apocarotenoids.

Previous studies have provided insights into the genetic and biochemical mechanisms underlying carotenoid biosynthesis in *Crocus* species. For instance, the genomic structures of two lycopene- β -cyclase genes, CstLcyB1 and CstLcyB2a, were characterized, revealing their distinct expression patterns in different *C. sativus* tissues[2]. It was found that CstLcyB2a is specifically expressed in flower stigmas, where it activates and boosts β -carotene accumulation[2]. Additionally, the carotenoid cleavage dioxygenase CCD2 was identified as a key enzyme in crocetin biosynthesis in saffron, further elucidating the pathway of apocarotenoid production[3]. Building on these findings, the recent study demonstrated that the A126L-CstLcyB2a mutation enhances the biosynthesis of crocin when transiently

expressed in *C. sativus* stigmas. Furthermore, stable expression of A126L-CstLcyB2a in *Nicotiana tabacum*, a model plant, resulted in increased accumulation of β -branch carotenoids and phytohormones such as abscisic acid (ABA) and gibberellic acids (GA's). These phytohormones play important roles in regulating plant growth and development. The transgenic *N. tabacum* lines exhibited better growth performance and improved photosynthetic parameters, including maximum quantum efficiency (F_v/F_m) and light-saturated capacity of linear electron transport.

The study also explored the effects of exogenous application of hormones and their inhibitors on biomass production. It was found that a higher ratio of GA4/ABA positively influenced the biomass of both wild-type and transgenic plants. This suggests that manipulating the levels of these phytohormones can enhance plant growth and productivity.

In summary, the introduction of the A126L mutation in the CstLcyB2a enzyme represents a significant advancement in the metabolic engineering of the carotenoid pathway in *Crocus sativus*. By diverting the metabolic flux towards β -carotene and apocarotenoid biosynthesis, this mutation enhances the production of valuable compounds such as crocin. The findings from this study provide a platform for the development of new-generation crops with improved productivity, quality, and stress tolerance. This research not only contributes to our understanding of carotenoid biosynthesis but also offers practical applications for enhancing the quality and resilience of saffron and other crops.

CSIR-NIO holds workshop on harnessing potential of marine venom in Mumbai

CSIR-NIO

28th August , 2024

The Goa-based CSIR-National Institute of Oceanography (CSIR-NIO) in collaboration with Hindi Vidya Prachar Samiti's Ramniranjan Jhunjhunwala College at Ghatkopar in Mumbai held a comprehensive workshop exploring the possible therapeutic applications of marine venom. The workshop titled Harnessing the power of marine venom: Research and outreach was attended by experts from across the country. It marked a significant advancement in both scientific research and public safety, according to a press statement.



The workshop focused on identifying venomous marine organisms and developing strategies to manage their venom risks while promoting conservation. This effort helps safeguard marine biodiversity and coastal communities, underscoring the growing importance of marine venom research.

With its potential for breakthroughs in drug discovery, biotechnology, and environmental conservation, marine venom, which is found in creatures like jellyfish, sea anemones, and cone snails, offers a rich source of bioactive compounds for therapeutic applications.

Coordinated by Dr. Narsinh L. Thakur, Senior Principal Scientist & Head of Chemical Oceanography Division at CSIR-NIO, the event was part of the outreach activities of the CSIR-funded Niche Creating Project on Biodiversity & Chemodiversity of venomous marine organisms. Dr. Usha Mukundan, the Director of Ramniranjan Jhunjhunwala College, talked about the significance of collaborative research in addressing societal challenges.

Dr. Himanshu Dawda, Principal of RJ College, extended a warm welcome to all participants and dignitaries. The opening address was given by Dr. Mandar Nanajkar, Principal Scientist & Head PME at CSIR-NIO, while Dr Thakur provided an overview of the workshop.

The event was also graced by Sanika Gupte, Convener of the workshop & Head of Zoology Department and Dr. Geeta Joshi, Organizing Secretary.

The workshop attracted a diverse group of 150 academicians, scientists, research scholars, and postgraduate students from across Mumbai. Participants engaged in a series of insightful sessions led by experts.

Dr Thakur presented a comprehensive lecture on the biodiversity and chemodiversity of venomous marine organisms. An interactive session on the "Identification of Marine Venomous Organisms" was led by Dr. Mandar Nanajkar and Dr. Kalyan De, scientists from CSIR-NIO, Goa.

Additional notable sessions included talks on the venomous marine organisms of the Mumbai coast by Pradip Patade, Co-founder of Marine Life of Mumbai, and on the functional characterization of ion channel toxins from marine ribbon worms by Prof. Jan Tytgat, Head of the Laboratory for Toxicology and Pharmacology at KU Leuven, Belgium, who joined remotely.

An interactive session with the CSIR-NIO team, led by Mr. Venkat Krishnamurthy, Principal Technical Officer, and anchored by Dr. Geeta Joshi, provided participants with the opportunity to explore educational and research opportunities at CSIR-NIO.

Antibiotic-resistant bacteria present in Mandovi, Zuari estuaries: NIO

CSIR-NIO

27th August , 2024

A recent study undertaken by the National Institute of Oceanography (NIO) has found worrying levels of antibiotic-resistant bacteria in the Mandovi and Zuari estuaries, raising serious concerns over risk to public health.

Researchers from the Council of Scientific and Industrial Research (CSIR) and the NIO found that some bacterial isolates showed resistance to up to 15 out of 16 antibiotics tested, with Multiple Antibiotic Resistance (MAR) index values as high as 0.94. Bacteria with more than 0.2 MAR index value are considered to be highly harmful to individuals exposed to these microbes.

The findings of the study call for a more integrated approach to urban planning, waste management and environmental conservation to mitigate the risks posed by the antibiotic-resistant bacteria and to maintain the ecological balance of these crucial estuarine systems.

The study, titled ‘Seasonal variations in water quality and antibiotic resistance of microbial pollution indicators in the Mandovi and Zuari estuaries, Goa, India,’ was conducted by six NIO researchers led by principal scientist Durbar Ray.

The team included Ashwini D Toraskar, Cathrine S Manohar, Charmaine L Fernandes, Abigayle D Gomes and Ajit Antony. The team examined water quality parameters and microbial pollution indicators across three seasons – pre-monsoon, monsoon and post-monsoon.

While the overall water quality improved during the monsoon season due to increased river runoff and flushing, the researchers found that this period also brought in harmful pathogens from terrestrial sources.

The Water Quality Index (WQI) was categorised as “poor” in both, pre-monsoon and post-monsoon seasons, only reaching “good” status during monsoon.

“Bacteria with > 0.2 MAR index are considered to be highly detrimental to the health of individuals exposed to these microbes. In this study, we have observed that during the monsoon season an isolate with the highest MAR index of 0.94 was obtained,” the report noted.

The study employed various analytical techniques to assess physicochemical parameters like temperature, salinity, pH, dissolved oxygen and nutrient levels. Microbiological analysis involved enumerating total viable bacterial counts and specific pollution indicator organisms on selective media. Antibiotic susceptibility testing was performed on representative bacterial isolates.

Of particular concern was the high antibiotic resistance observed in some bacterial strains, especially during the monsoon season. Ninety bacterial isolates from three seasons were tested for antibiotic resistance. In pre-monsoon, 30 of 35 isolates resisted Clindamycin (used for treating bacterial infections), while all were susceptible to Ofloxacin and Tetracycline (used for urinary tract infections). One coliform isolate showed resistance to 15 out of 16 antibiotics tested.

The researchers noted that while monsoon rain helps improve overall water quality due to dilution, it can also introduce antibiotic-resistant bacteria from terrestrial runoff, posing potential health risks to those using the estuaries.

“This shows that the seasonal changes along with the increased terrestrial load from different sources can alter the water quality in the estuarine region and the virulence of the microbes in these habitats,” the report stated.

Total viable bacterial counts were highest during pre-monsoon and monsoon seasons,

reaching up to 10^6 CFU/ml in water samples. The abundance of specific Pollution Indicator Organisms (PIOs) varied seasonally, with some groups like Vibrio-like organisms (VLOs) showing peak counts of 10^3 - 10^5 CFUs during the pre-monsoon period.

“Any reduction in the monsoon rains and an increase in the number of virulent PIOs entering the estuarine habitat can alter the microbial community structure. Hence, adequate treatment of urban runoff and terrestrial inputs into the estuarine regions has to be undertaken,” the report stated.

Newly engineered proteins could offer safer and more effective gene therapies

CSIR-IGIB

27th August , 2024

An improved gene editor — about 3.5 times better at reaching different parts of the human genome — can correct a mutation associated with a genetic eye disorder that causes blindness in children¹. Traditional Cas enzymes often show reduced editing efficiency or complex PAM (protospacer adjacent motif) requirements, limiting their therapeutic potential.

Scientists at the CSIR-Institute of Genomics and Integrative Biology in Delhi and the University of Tokyo in Japan engineered enhanced Cas9 variants from *Francisella novicida* (enFnCas9). They modified the enzyme's WED-PI domain and the phosphate-lock loop of the Cas enzyme to create three new variants with enhanced kinetic activity, increased PAM binding affinity and a negligible change in specificity.

The improved versions outperformed the commonly used *Streptococcus pyogenes* Cas9 (SpCas9) and its engineered derivatives in on-target editing efficiency, knock-in rates and off-target specificity.

Researchers at the LV Prasad Eye Institute in Hyderabad then tested the base editor's editing efficiency using patient-specific induced pluripotent stem cells derived from an individual with the genetic eye disorder Leber congenital amaurosis type 2 (LCA2).

The enFnCas9 adenine base editor was applied to correct the specific point mutation in the RPE65 gene. This editing restored the normal sequence of the gene, enabling production of full-length, functional RPE65 protein in the cells. Future research may explore further optimisation and broader applications of these engineered Cas variants in both diagnostics and therapeutics, the researchers say.

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National Aerospace Labs Issues RFP for Loitering UAV Development

CSIR-NAL

26th August , 2024

National Aerospace Laboratories (NAL) has launched a Request for Proposal (RFP) seeking partners to develop cutting-edge loitering unmanned aerial vehicles (UAVs). This initiative is aimed at advancing India's defence technology and bolstering its capabilities in aerial surveillance and precision strikes.

The RFP outlines requirements for the design, development, and delivery of loitering UAVs that can perform extended surveillance and attack missions. These UAVs are expected to be equipped with advanced avionics, high-resolution imaging systems, and precision-guided munitions. The project is a key part of NAL's strategy to enhance indigenous defence technology and reduce reliance on foreign systems.

The development of loitering UAVs will enable more effective monitoring and targeted operations in both military and strategic scenarios. The technology promises to offer significant improvements in mission flexibility and operational efficiency, with applications ranging from border security to counter-terrorism operations.

Interested firms are invited to submit their proposals, including technical specifications, development timelines, and cost estimates. The project reflects India's growing emphasis on strengthening its defence sector through domestic innovation and technological advancement.

This move aligns with the broader defence modernization efforts by the Indian government, aiming to position the country at the forefront of global aerospace technology. The 14th RAHSTA Expo, part of the India Construction Festival, will be held on October 9 and 10, 2024, at the Jio Convention Centre in Mumbai. For more details, visit: <https://rahstaexpo.com>

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