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RIS Science Diplomacy News Alert is your fortnightly update on Indian and global developments in scientific research, technological advancements, and G-20, global challenges, science diplomacy, policy and governance. The archives of this news alert are available at https://fisd.in/en/alerts-archives. Please email your valuable feedback and comments to science.diplomacy@ris.org.in.

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SCIENCE & TECHNOLOGY

GLOBAL

Combating B1 Deficiency: Scientists Develop Biofortified Variety of Rice

A multinational team of researchers hailing from the University of Geneva, ETH Zurich and NCHU Taiwan have developed a variant of rice with an improved vitamin B1 content. The deficiency of vitamin B1 is a major public health challenge in regions which consume rice as a staple food. Also known as thiamine, the deficiency of vitamin B1 causes diseases that affect the cardiovascular and nervous system. The B1 content is rice is often lost through manufacturing processes such as polishing. The research team achieved biofortification through enhancing the tissue the makes up the bulk of the rice (the bran which contains the vitamin is removed during processing). The new discovery is significant because it provides a solution for the same while not compromising on agricultural yield.

Researchers at University of Manchester Discover Revolutionary Molecular Device

In a first-of-its-kind development, researchers from the University of Manchester have developed a molecular device which can simultaneously release multiple molecules. The achievement can potentially have revolutionary implications for medical and material engineering. The device draws upon force to facilitate the release of multiple small molecules. It has been designed based on a novel technique which uses rotaxane, a type of interlocked molecule. Researchers have so far had limited success with respect to creating a device that can deliver more than one molecule. This is because of the occurrence of a molecular level ‘tug of war’ where two polymers tug from both sides to release one molecule. If delivered to an injured or damaged site of the body, the molecular device releases medicines or healing molecules to target the area. The discovery also has the potential for enabling further advances in self-healing materials.

Max Space Unveils New Design for Inflatable Space Habitats

Max Space, a leading private space player has showcased its inflatable space habitats at the 39th Space Symposium held in Colorado Springs, USA between 8-11 April 2024. The habitats which can be launched while compressed can purportedly be expanded in outer space as required. According to the company, it can expand to become comparable to the internal volume of a sports stadium, without compromising structural stability. Max Space has been specializing on space habitats for over two decades and has been able to optimize this unique design for mass production which is expected to commence soon. Its inaugural module is expected to be launched in 2026 aboard a launch vehicle operated by SpaceX. The habitations can be deployed in the moon, Mars or the Low Earth Orbit can support activities ranging from scientific exploration to manufacturing.

Newly discovered Organelle Could Help Reduce Use of Chemical Fertilisers

In a major development, scientists have discovered an organelle which can trap nitrogen and convert into a usable form. The organelle which has been named nitroplast is expected to help reduce dependence on chemical fertilisers. The breakthrough resulted out of a decade-old study which first noted how the interaction between UCYN-A, a bacterium and a certain species of marine algae helped the latter absorb nitrogen better. The latest study has however concluded that UCYN-A is an organelle (a subunit or 'organ' within a cell) rather than a separate living organism. This leaves open the door to numerous possibilities to use nitroplast to engineer crops that can cater to their own needs for nitrogen. However, achieving the same is a tough feat. Transferring genes in a stable manner from generation to generation would be the most difficult thing to achieve, states Eva Nowack, a researcher who specializes in symbiotic bacteria at the Heinrich Heine University, Düsseldorf, Germany.

INDIA

Managing Microplastics: IISc Researchers Develop Sustainable Hydrogel

Scientists at the Indian Institute of Science have developed a sustainable hydrogel which can be utilized to filter microplastics from water. According to the IISc, the hydrogel consists of a network three polymers woven into each other namely:chitosan, polyvinyl alcohol and polyaniline.This networked architecture is infused with Copper Substitute Polyoxometalate nanoclusters which utilise UV light to irradiate the microplastics. "The combination of the polymers and nanoclusters resulted in a strong hydrogel with the ability to adsorb and degrade large amounts of microplastics", the IISc noted. After the end of its useful life, the hydrogel can also be recycled to build carbon nanomaterials to remove heavy metal content from water which bind the pollutants.

Drone Used to Execute Mid-surgery Tissue Transfer in Key ICMR Trial

The Indian Council of Medical Research (ICMR) has successfully executed a mid-surgery tissue transfer using a drone in Udupi, Karnataka in a first trial of its kind. The tissue samples collected from a patient at the Dr.TMA Pai Hospital, Karkala were successfully delivered to the Kasturba Medical College, Manipal, situated at about 37 kilometres away. The reports were promptly sent to the TMA Pai Hospital after analysis. The trial was conducted as a part of the Idrone initiative which is jointly managed by the ICMR, India's Ministry of Civil Aviation and the Directorate General of Civil Aviation. The initiative seeks to explore the possibilities for employing drones to facilitate the delivery of vaccines and essential drugs to difficult and inaccessible territories.

Medical Calibration Facility on the Wheels: IIT Madras Launches a First-of-its-kind Initiative

The Indian Institute of Technology Madras has launched a unique "medical devices calibration facility on wheels". The mobile facility seeks to provide means to test and maintain medical devices at affordable rates to ensure accurate and effective diagnosis and treatment of diseases. The facility is purportedly the first of its kind and a model that could help achieve UN Sustainable Development Goal 3 which pertains to health and well-being for all. The initiative

has been termed an important means to make frequent medical calibration both accessible and affordable. Prof. V. Kamakoti, Director, IIT Madras termed the inauguration of the facility as "a progressive step towards affordable, scalable, quality health care for all".

GLOBAL CHALLENGE

Agricultural Productivity v Biodiversity Preservation: Hybrid Intelligence Can Resolve Conflicting Priorities

Researchers at the Technical University of Munich and the University of Hohenheim have developed an AI-enabled approach to achieve biodiversity preservation, without impacting agricultural productivity. The researchers have termed this approach as "hybrid intelligence approach" in a paper recently published in Nature Food. The hybrid intelligence approach essentially combines human intuition with the ability of AI to analyse large volumes of data to address the complexity of the problem at hand. It further draws from multiple discipines including computer science and engineering , natural and social sciences to account for ecological, social as well as economic processes. The ability to gain a wholesome picture from numerous datasets purportedly makes it easier to make cost-benefit analyses and assess larger impacts on crop yields vis-à-vis biodiversity loss. Sharing key insights gained from the study, Prof.Henner Gimpel, Department of Digital Management, University of Hohenheim highlighted that similar hybrid intelligence systems need to be made ethical and trustworthy in order to attain their true potential.

CRISPR can boost crops' resistance to climate change

Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) is widely regarded as a major gamechanger in genetics and biotechnology. A few recent reports have looked into how the gene editing tool could be used to yield climate change resistant food crops. A number of startups as well as research institutions are actively exploring such possibilities. Bayer for instance, is collaborating with Pairwise, a renowned agricultural company to create a variant of corn which is highly resilient to environmental factors. Meanwhile, the Gates Foundation has also been funding the field trials of gene edited rice varieties India and Mexico.

Sepsis Immunoscore: FDA Grants Its First Approval to an AI Diagnostic Tool

Sepsis Immunoscore, has become the first AI-enabled diagnostic tool to gain an approval from the US Food and Drugs Administration. The tool has been designed for early detection of sepsis, the diagnosis of which has been a major challenge within the US healthcare system. The tool is essentially a software which employs AI to assess 22 parameters including biomarkers and clinical data to gain clarity on the presence of sepsis or the possibility of a patient developing it. Within a 24-hour timeframe post-patient evaluation, the tool can further provide a risk score based on its assessment as well as categorise the same into four levels of risk. Based on this categorisation, the tool can recommend the type of care required, including how long the patient might need to be hospitalised.

RESOURCES & EVENTS

Kodaikanal Solar Observatory Celebrates Marks 125th Anniversary

The Kodaikanal Solar Observatory (KSO) celebrated its 125th anniversary on 1 April 2024. The celebrations were organised by the Indian Institute of Astrophysics (IIA), an autonomous body under the Department of Science and Technology, Government of India. The KSO was established in 1899 and is renowned for housing a rich repository of images of the sun recorded daily since it started operations. The database has also been digitised and openly accessible to astronomers from around the world. The KSO scientists were felicitated at the event. A new logo of the KSO was unveiled at the event by A.S. Kiran Kumar, former Chairman, Indian Space Research Organisation.

The UN Commission for Science and Technology for Development Commences its Annual Summit

The opening plenary of the 27th annual session of the United Nations Commission on Science and Technology for Development (CSTD), a subsidiary body of the ECOSOC (Economic and Social Council) was held on 15 April, 2024. The CSTD serves as a nodal point for UN-level deliberations on utilising science, technology and innovation for development and particularly for realizing the Agenda 2030. The deliberations focused on the dual themes of "data for development" and "global cooperation in science, technology and innovation for development". The CSTD is also expected to review the progress made with respect to the implementation of the outcomes of the World Summit on the Information Society. The event is expected to be attended by multiple stakeholders from the government, civil society and the private sector.

Delphi Forum discusses Microsatellites, Artificial Intelligence

The potential for microsatellites and artificial intelligence to provide solutions for the challenges facing humanity was highlighted at the recently concluded session of the Delphi Economic Forum. Founded in 2016 in Athens, Greece, the Delphi Forum is a multistakeholder organization. Its annual meetings seek to serve as forums to discuss geopolitics, global challenges, finance and so on. Addressing the forum, Greece's Minister of Digital Governance Dimitris Papastergiou pointed to the vast opportunities that microsatellites offer with respect to disaster management, urban planning and civil protection. Speaking on AI's vast potential to offer solutions, the minister stressed on the need to build domestic AI infrastructure including data centres. Discussions at the forum also highlighted the need to build equitable non-discriminatory AI systems. The need to bolster cybersecurity and build awareness against cyberattacks were further deliberated upon.

SCIENCE POLICY AND DIPLOMACY

Japan-USA Announce Collaboration on Sustainable Lunar Exploration

Japan and the USA have inked a landmark agreement to collaborate upon the sustainable human exploration of the moon. As per the terms of the agreement, Japan would design, develop and

operate a pressurized rover to undertake crewed as well as uncrewed exploration of the moon. The USA on the other hand shall launch the lunar spacecraft and has also agreed to offer two rides to Japanese astronauts to the moon. US President Joe Biden and Japanese Prime Minister Fumio Kishida further declared "a shared goal for a Japanese national to be the first non-American astronaut to land on the Moon on a future Artemis mission, assuming important benchmarks are achieved."

Australia Announces Science Diplomacy Fund Worth 40 million AU$

In a bid to grow its science and technology footprint in the Asia-pacific region, Australia has announced a new science diplomacy fund worth 40 million Australian Dollars. A total of 6 million Australian Dollars would be doled out during the first phase, for which the applications close on 31 May 2024. The fund is jointly managed by the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering. It is intended to finance research and development in five areas namely: advanced manufacturing, quantum computing, artificial intelligence, hydrogen production and RNA research. The projects are sought to be implemented in Indonesia, Malaysia, Singapore, Thailand, Vietnam, New Zealand, Japan, South Korea and Brazil.

Hungary to Propose Major Bioeconomy Initiative During Upcoming EU presidency

Hungary is planning to spearhead the development of a thriving bioeconomy in Central and Eastern Europe as it prepares to assume the presidency of the European Union during the second half of 2024. The project may purportedly draw inspiration from the Partnership for Research and Innovation in the Mediterranean Area (PRIMA). A grouping consisting of 19 EU member-states, the PRIMA seeks to boost mutual collaboration over areas including agriculture, water management and food production. Hungary may also look to realise its bioeconomy initiative through co-financing the same through the Horizon Europe Research Program. The initiative is expected to cost at least 400 million Euros, half of which will be borne by the European Commission, with the participating member-states pitching in the other half. Hungary is expected to present the initial proposal at Brussels on 4 July 2024.

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