

Indian Science in Indian Media



Highlights of India Science Wire (ISW) stories

May -2018



India Science Wire - highlighting Indian science in Indian media

The coverage of science and technology particularly relating to research done in Indian research institutions, is generally very poor in Indian media. There are several reasons for this situation, one of them being the lack of credible and relevant science content. In order to bridge this gap, Vigyan Prasar launched a unique initiative - India **Science Wire (ISW)** – in January 2017.

The news service is dedicated to developments in Indian research laboratories, universities and academic institutions. Almost all news stories released by this service are based on research papers by Indian scientists published in leading Indian and foreign journals. All news stories and features are written and edited by a team of professional science journalists with decades of experience in science journalism.

News stories based on happenings in Indian research labs are released to media houses on a daily basis. These stories are also uploaded on ISW website and are simultaneously promoted through social media – Twitter and Facebook. At present, the service is available in English and Hindi.

Reach out ISW Editor with story ideas, comments and suggestions at indiasciencewire@gmail.com

ISW website: <http://vigyanprasar.gov.in/isw/isw.htm>



ISW stories released and published in May 2018

Total number of stories released:

| S.No | Story title | Date of release | Name of the writer |
|------|--|-----------------|--------------------------|
| 1 | Earthworm gut may offer new ways of efficient recycling of organic waste | May 1 | Monika Kundu Srivastava |
| 2 | Super tiny particles derived from table sugar can detect lead in water | May 1 | Aditi Jain |
| 3 | Just tweaking time of administration can make cancer drugs more effective | May 2 | Sarah Iqbal |
| 4 | Smart device developed for precise use of herbicides | May 2 | Manu Moudgil |
| 5 | नदियों में प्रदूषण की निगरानी के लिए मिला नया तरीका | May 2 | Umashankar Mishra |
| 6 | Ozone pollution can damage wheat crop | May 3 | Sarah Iqbal |
| 7 | Scientific departments to get a new home | May 3 | Sunderarajan Padmanabhan |
| 8 | आधारभूत विज्ञान आधारित नवाचार पर हो विज्ञान और प्रौद्योगिकी का जोर | May 3 | Navneet Kumar Gupta |
| 9 | विज्ञान और प्रौद्योगिकी विभाग को जल्द मिलेगा नया घर | May 3 | Umashankar Mishra |
| 10 | Research management critical for Indian labs to become competitive | May 4 | Aditi Jain |
| 11 | Western Ghats biodiversity is a significant source of moisture for monsoon | May 4 | Raghu Murtugudde |
| 12 | Creating a botanical garden on pinhead | May 7 | Hardev Singh Virk |
| 13 | New technique to detect Chronic Kidney Disease | May 7 | Umashankar Mishra |
| 14 | किडनी रोगों की पहचान के लिए नई तकनीक | May 7 | Umashankar Mishra |
| 15 | Massive exercise underway to map air pollution sources in Delhi | May 8 | Dinesh C Sharma |
| 16 | Scientists develop new ceramic-based piezoelectric material | May 8 | Sunderarajan Padmanabhan |

| | | | |
|----|---|--------|--------------------------|
| 17 | An isabgol based wound material to treat diabetic wounds | May 9 | Jyoti Singh |
| 18 | Scientists find synthetic mimic for critical biomolecule | May 9 | Ratneshwar Thakur |
| 19 | भूखलन के खतरे को कम कर सकती है नियमित निगरानी | May 9 | Umashankar Mishra |
| 20 | Nanofertilizers can boost zinc uptake in wheat | May 10 | Vaishali Lavekar |
| 21 | Innovative technologies for clean environment | May 10 | Jyoti Singh |
| 22 | स्वच्छ पर्यावरण के लिए विज्ञान और प्रौद्योगिकी आधारित नवाचार | May 10 | Umashankar Mishra |
| 23 | PAHs around refineries may not be bio-accessible | May 10 | Monika Kundu Srivastava |
| 24 | National Technology Awards presented | May 11 | Sunderarajan Padmanabhan |
| 25 | Young Indian innovators all set to compete with best brains from 78 countries | May 11 | Sunderarajan Padmanabhan |
| 26 | उन्नत प्रौद्योगिकी के विकास लिए उद्यमियों को राष्ट्रीय पुरस्कार | May 11 | Umashankar Mishra |
| 27 | बढ़ती कार्बन डाइऑक्साइड से फसलों में बढ़ सकता है कीट प्रकोप | May 11 | Shubrata Mishra |
| 28 | Scientists a step closer to potential vaccine against Leptospirosis | May 14 | Shikha T Malik |
| 29 | Children display innovative and eco-friendly ideas | May 14 | Jyoti Singh |
| 30 | Theoretical physicist E.C.G.Sudarshan passes away | May 14 | Sunderarajan Padmanabhan |
| 31 | India is warming rapidly | May 15 | Dinesh C Sharma |
| 32 | Soaking seeds in selenium reduces arsenic content in rice | May 15 | Aditi Jain |
| 33 | Metal-organic nanosheets may help develop novel lens material | May 16 | Ratneshwar Thakur |
| 34 | मक्का उत्पादकता बढ़ाने के लिए जरूरी है नई रणनीति | May 16 | Umashankar Mishra |

| | | | |
|----|---|--------|--------------------------|
| 35 | Darjeeling tea faces climate risk | May 17 | Dinesh C Sharma |
| 36 | महिलाओं के अनुकूल कृषि मशीनीकरण की नई पहल | May 17 | Shubrata Mishra |
| 37 | Scientists gain new insight into neurodegenerative diseases using fruit flies | May 18 | Sunderarajan Padmanabhan |
| 38 | Training health workers can help manage hypertension in villages | May 18 | Jyoti Singh |
| 39 | Indian school kids shine at Intel science fair | May 21 | Sunderarajan Padmanabhan |
| 40 | New technology to detect chikungunya virus | May 21 | Umashankar Mishra |
| 41 | चिकनगुनिया वायरस की पहचान के लिए नई तकनीक | May 21 | Umashankar Mishra |
| 42 | Scientist uncover a piece in the puzzle of macrophage activation | May 23 | Ratneshwar Thakur |
| 43 | Coral bleaching of 2016 caused severe mortality in Gulf of Mannar: study | May 23 | Ravi Mishra |
| 44 | भारतीय गणितज्ञ, जिन्होंने आइंस्टीन के सिद्धांत का किया सरलीकरण | May 23 | Navneet Kumar Gupta |
| 45 | Deciduous trees with compound leaves more tolerant to air pollution: study | May 24 | Aditi Jain |
| 46 | New nanocomposite can help in cleaning air | May 24 | Dinesh C Sharma |
| 47 | Judicious use of bioinsecticide may help control filariasis vector | May 25 | Monika Kundu Srivastava |
| 48 | नींबू-वंशीय फल चकोतरा में मिले मधुमेह-रोधी तत्व | May 25 | Umashankar Mishra |
| 49 | Artificial membrane inspired by fish scales may help in cleaning oil spills | May 28 | Ratneshwar Thakur |
| 50 | Microneedle-based system can take pain away from vaccinations | May 28 | Yogesh Sharma |
| 51 | Indian scientists develop building block of | May 29 | Dinesh C Sharma |

| | | | |
|----|---|--------|--------------------------|
| | optical computing | | |
| 52 | New way found to enhance strength and ductility of high entropy alloys | May 29 | Sunderarajan Padmanabhan |
| 53 | वैज्ञानिकों ने बनाया चलता-फिरता सौर कोल्ड स्टोरेज | May 29 | Shubrata Mishra |
| 54 | Indian scientists find new clues to Parkinson's | May 30 | Sunderarajan Padmanabhan |
| 55 | Look beyond protected areas for conservation of endangered hangul in Kashmir: study | May 30 | S Suresh Ramanan |
| 56 | संयुक्त पत्ती वाले पतझड़ी पेड़ों में प्रदूषण झेलने की क्षमता सबसे अधिक | May 30 | Aditi Jain |

Earthworm gut may offer new ways of efficient recycling of organic waste

[INDIA SCIENCE WIRE](#)
MAY 1

NEW DELHI,

Earthworms are considered best friends of farmers, acting as engineers in soils. They are helpful in decomposition of waste, producing biofertilizers. Indian scientists have investigated the gut of earthworms to get an insight into why they are so efficient in helping decomposition. They have found that the gut of earthworms provides an ideal environment for nurturing a variety of cellulose-degrading bacteria because of which they are able to convert organic waste from plant sources into fertilizer or compost.

A team of scientists led by Dr. Narayan C. Talukdar at the Institute of Advanced Study in Science and Technology in Guwahati, studied two types of earthworms—those which are found on the surface of soil (*Perionyx excavatus* or composting earthworms) and those found under the soil (*Glyphidrilus spelaeotes* or semi-aquatic freshwater earthworms). Bacteria drawn from the gut of earthworms were cultured and separated on the basis of their rate of growth and general structure.

According to results published in the journal *Current Science*, the use of a technique called ‘16S rRNA gene-based taxonomic analysis’ revealed distinct composition of cellulose-degrading bacteria specific to each type of earthworm.

The rate at which cellulose was broken down by an enzyme (cellulase) found in these gut bacteria was much higher than that found in *Cellulomonas cellulans*, a bacteria whose distinguishing feature is breaking down of cellulose and was used as a reference for the study. This was clear from higher amounts of carbon generated from earthworms vis-à-vis *Cellulomonas cellulans* after 20 days of decomposition of rice straw in its natural environment.

Further analysis also revealed that the growth rate of cellulose-degrading bacteria in semi-aquatic freshwater earthworms was much faster than composting earthworms thus, making them more efficient decomposers of rice straw.

The earthworm gut hosts many microorganisms. Earthworms eat plants, which contain cellulose (a complex sugar) as an important part of a plant cell wall. Cellulose-degrading bacteria in the gut of earthworms break it down into carbon, hydrogen and oxygen which make up most of the soil organic matter. “Knowledge on occurrence and screening of

efficient cellulose-degrading bacteria within the gut wall of earthworms may help in efficient cycling of organic residues either in field conditions or in the compost-making process,” pointed out Dr. Talukdar.

In rice growing tropical and sub-tropical regions, cellulose-containing rice straw remains in the field after harvesting and needs to be decomposed quickly for efficient release of nutrients. In the summer to winter rice-cropping system prevalent in North East India, summer rice straw needs to be recycled 20 to 30 days prior to transplanting of winter rice. It has however, been reported in previous studies that the freshwater earthworm in submerged rice fields can decompose rice straw under the favourable temperatures of July–August but, the cycling of winter rice straw in field condition is slowed down due to low temperature in winter months.

The other members of the research team were Kishore K. Dey and Fenella M. W. Nongkhlaw (Central Agricultural University, Umiam, Meghalaya). This research was funded by the Indian Council of Agricultural Research, New Delhi.

Monika Kundu Srivastava; Twitter handle: @monikaksrivast1

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DownToEarth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT,
ENVIRONMENT AND HEALTH

Super tiny particles derived from table sugar can detect lead in water

[Aditi Jain](#) [@AditiJain1987](#) | Wednesday 02 May 2018

Indian researchers derived a technique to show that nanoparticles from table sugar can be used as sensor for detection of lead in water



 Credit: Gunillaa G/Flickr

Nano technology deals with particles that are several thousand times smaller than human hair, and it is being put to use in variety of applications such as drug delivery and diagnostic tests.

A group of Indian researchers has now developed a simple technique for deriving nanoparticles from table sugar and have shown that these particles can be used as sensor for detection of lead in water.

In recent years, scientists have been looking for ‘green’ sources to derive nanoparticles. Super tiny nanoparticles – known as carbon dots - have been derived from lemon peel, banana juice and orange peel. Conventionally, carbon dots are derived from graphite or carbon nanotubes using physical methods.

The research team at the University of Calicut has produced carbon dots from table sugar. For this, sugar was melted at high temperature (150 degrees celsius) and diluted with ammonia solution. It was then put under microwave for few minutes and finally filtered and freeze-dried to yield quantum dots containing carbon.

Scientists tested if these dots could be used for estimating levels of various metal ions (cadmium, mercury, copper, lead, iron, potassium, aluminum, nickel, sodium, cobalt, chromium, magnesium, calcium and zinc). They found that the dots in the water precipitate only in the presence of lead ions. Interestingly, this precipitation by dots is seen only when the levels of lead is more than 14 parts per billion - which is also the permissible limit of lead in water as per US Environmental Protection Agency.

“Lead is most common heavy metal ion pollutant in water. It causes severe issues in the development of the brain and nervous system along with different health problems including hypertension and gastrointestinal inflammations etc. This low-cost and simple method can be used widely for assessing lead ions in drinking water,” explained Dr. Renuka N. K, who led the team, while speaking to *India Science Wire*.

The results of this study have been published in journal *Sensors and Actuators B: Chemical*. The research team included V.A Ansi and N.K Renuka from the University of Calicut, Kerala.

(India Science Wire)

APN



Just tweaking time of administration can make cancer drugs more effective

~By Sarah Iqbal May 3, 2018

Just by changing the time of administering drugs, doctors may be able to improve outcome of cancer therapy, suggests new research done at the Indian Institute of Technology-Madras (IITM).

This work is rooted in rhythms of reactive species production. In the course of day-to-day life, all life forms produce highly reactive molecules called reactive species. While small doses of these molecules can aid biological functions, when produced at high rates, they can also kill the cell by creating oxidative stress. Most cancer drugs seek to kill malignant cells by producing rapid bursts of reactive species. But because there is a lack of specific action, drugs also end up affecting normal cells surrounding cancerous tumours.



Researchers at IITM

Variation in internal reactive species production has been a neglected area of research. The research team at IITM led by GK Suraishkumar has found that there's a lot of fluctuation in levels of reactive species within a cell. These short-term fluctuations can be ignored when one is studying a much slower process such as cell growth, and work with average levels instead.

Cancer therapy relies on increasing oxidative stress beyond a critical point. Therefore, the timing of internal rhythms in reactive species production is crucial. Scientists found that two important reactive species used for targeting cancer cells – superoxide radicals and hydroxyl radicals – peak at an interval of 15.4 hours and 25 hours respectively.

They reasoned that by aligning drug administration with internal rhythms of reactive species production, the efficiency of drugs could be increased. To test this hypothesis, they administered two drugs menadione and curcumin to cervical cancer cell lines and a colon cancer cell line.

Just by changing the timing of drug administration, researchers could reprogram internal rhythms of reactive species production. For instance, treating cancer cells with curcumin at the time of increased superoxide production ensured that the superoxide radical would peak after every 9 hours. By tuning drug dose to hydroxyl radical production, the periodicity of its

rhythm was reduced from 25 hours to 11 hours. This, in turn, improved the drug efficiency by 20%.

The strategy is noninvasive and can be extended to any cancer drug that operates via production of reactive species. The researchers are now planning to extend this to patients. “All we will have to do is change the timing of treatment in tune with the peaking of reactive species production,” explained Suraishkumar while speaking to *India Science Wire*. “We believe that doing so will also reduce the complications associated with cancer treatment.”

The research team also included Karunagaran, Raghunathan Rengaswamy, Uma Kizhuvetil, Meghana Palukuri, Prerna Bhalla and Steffi Jose. The research project is financially supported by the Science and Engineering Research Board of the Department of Science and Technology (DST).

([India Science Wire](#))

Smart Device Developed For Precise Use of Herbicides



weed eradicator

Smart Device Developed For Precise Use of Herbicides

May 2, 2018

A group of Indian and American researchers have developed a weed removal device for precise application of herbicide that can reduce crop damage and contamination.

By [Manu Moudgil](#)

Chandigarh, May 2: India loses agriculture produce worth several hundred crores of rupees every year to weeds. While removing weeds manually is laborious, use of chemicals to destroy them is hazardous to environment and crops. A group of Indian and American researchers have developed a weed removal **device** for precise application of herbicide that can reduce crop damage and contamination.

The tractor-mounted device releases the precise amount of herbicide after sensing weed density through image analysis. Amount of herbicide varies for every 5 percent change in weed infestation unlike the conventional system that uses the same amount of chemical on a given plot. The device has been developed for crops with row-to-row spacing of 350-450 millimeters.

Field experiments on dryland with groundnut and maize crops have shown that the use of the device increased production, reduced crop damage and also saved around 80 percent of the herbicide as compared to conventional systems of herbicide use.

“We have used sponge rollers which apply the herbicide through contact with weeds instead of spray done by conventional devices. This technique overcomes losses due to chemical drift and soil percolation resulting, which reduces environmental contamination,” explained Abhilash Kumar Chandel, a member of the research team, while talking to *India Science Wire*.

While contact-type weed eradicators have been developed in the past, this device introduces variability to the dose of herbicide in proportion to weed density. The apparatus includes a storage tank, pipelines, cameras, deflectors, ground wheel and sponge rollers, all connected to the back of a tractor moving at a speed of 2.1 km per hour. The processing unit consists of a laptop with digital image analyzer application.

The herbicide can be applied simultaneously in six parallel rows which are served by a camera and sponge roller each. The main crop is restricted from the field of view of the camera through deflectors so that only weeds appearing between the rows is captured by the cameras and treated with the herbicide thus ensuring minimum crop damage.

The field experiments showed that groundnut plant damage with the device was 3.6 times less than constant spray application (CSA) and 1.37 times less than constant contact application (CCA). In the case of maize, the plant damage was 2.72 times less than CSA and 1.33 times less than CCA.

The yield coefficient of the plots of two crops treated with the device was higher than the plots where CSA and CCA were used. The results have been published in journal *Current Science*.

The device is not yet ready for the market as researchers still need evaluate the prototype and make its processing unit more robust. “We want to replace the laptop with a small analytical device which will also reduce the cost. The reliability and feasibility of the weed eradicator needs to be tested for other crops as well,” said Chandel. The research team also wants to offer a variant of the device which can be handheld since many farmers can’t afford to use tractors.

“The actual efficiency of the device will only be known when it comes to the field as there are several factors beyond technology which can determine its performance. It also needs to be affordable for the farmers,” commented Vikram Ahuja of Zamindara Farm Solutions, a Punjab-based farm equipment company.

The research team included A K Chandel from Washington State University; V. K. Tewari and Aditya Agarwal (Indian Institute of Technology, Kharagpur); Satya Prakash Kumar (Central Institute of Agricultural Engineering, Bhopal); and Brajesh Nare (Central Potato Research Institute, Shimla).

[\(India Science Wire\)](#)

Ozone Pollution can Damage Wheat Crop



Air pollution is not only injurious to human health, but also to plant life. Scientists from Banaras Hindu University (BHU) have found that most wheat cultivars developed after the year 2000 are more sensitive to damage due to ozone, a byproduct of air pollution. This can affect wheat productivity under field conditions.

On the ground, ozone is produced by reaction of nitrites and volatile organic compounds released in abundance by automobiles and industries. There has been a rise in ozone levels since the industrial revolution and the levels are projected to increase further.

“Once it enters plants, ozone can cause oxidative stress and affect their photosynthetic machinery. Often the leaves start yellowing and lose the ability to fix carbon dioxide into food.

All these changes can decrease crop yield,” Dr Shashi Bhushan Agrawal, Professor at the Department of Botany, BHU, who led the study, told India Science Wire. Wheat crop is particularly sensitive to ozone. So researchers assessed the extent of ozone toxicity in 14 varieties of wheat that have been developed over a period of 42 years (1970-2012). Selected wheat cultivars were grown in specially designed open top chambers at BHU

campus between December 2014 and March 2015. One group of cultivars was grown in ambient ozone concentration, while the other group was subjected to elevated ozone levels. At the end of the experiment, plants were uprooted and compared in terms of yield, total biomass, growth and functional leaf area. The researchers found that all the plants exposed to higher ozone levels carried greater signs of ozone damage. There were spots on leaves, decreased root and shoot length and reduction in dry weight.

The intensity of ozone toxicity varied highly between all the 14 cultivars. Only 5-8% of leaf area was damaged in old cultivars as opposed to 12-19% non-functional leaf area in new varieties.

Similar trends were also found for plant height, root growth and shoot growth. Scientists also noticed that grain yield was adversely affected in most varieties developed after the year 2000.

“This is because while developing new varieties, breeders try to maximize the photosynthetic rates of crops. But to make more food, plants need to absorb more carbon dioxide. So they open their pores – stomata – for longer periods of time. Ozone present in the environment can also gain easy entry into the plants through their stomata and damage the cells,” said Prof. Agrawal.

Dr. Vivek Pandey, senior scientist at the National Botanical Research Institute, Lucknow finds this study useful as it tested a large number of wheat varieties against ozone toxicity. “The study has identified certain important traits which provide tolerance to wheat varieties against high ozone and these traits could be potentially useful for developing future ozone tolerant wheat varieties,” Dr Pandey, who is not involved with the BHU study, told India Science Wire.

Prof Agrawal believes that this study will prompt more breeders to select ozone resistance as a desirable trait for wheat varieties. This has implication for prominent wheat producing regions in India like the Indo-Gangetic plain that suffer from heavy ozone pollution.

The research team included Aditya Abha Singh, Adeeb Fatima, Nivedita Chaudhary, Amit Kumar Mishra, Arideep Mukherjee, Madhoolika Agrawal and Shashi Bhushan Agrawal from BHU. The study, published in journal Environmental Monitoring and Assessment, was funded by the Science and Engineering Research Board of the Department of Science and Technology (DST).

Sourced from ISW



Posted by **Research Stash**

Scientific Departments to Get a New Home

3. May

It is not enough that scientists and technologists keep gaining new knowledge and developing new products useful to society. They should also have a workplace befitting their work profile.

Keeping this in mind, the Ministry of Science and Technology has set out to construct a modern building complex for two of its wings – Department of Science and Technology (DST) and Department of Scientific and Industrial Research (DSIR) – as well as autonomous institutions under them. The new building complex will come up at Qutab Institutional Area here at a cost of Rs. 192 crore.



The highlight of the new complex would be that it would be environment-friendly. It would have a 110-kilo liter per day sewerage treatment plant and treated water would be used for horticulture works. In addition, light

fixtures would be LED-based for the external area and for building façade. There would be a 300 kwp capacity grid interactive solar power generation system and rainwater harvesting pits would be set up in different parts of the campus to help recharge groundwater.



The campus would also have a large green landscaped central courtyard with sculptured works of arts at the center and sit-out areas. The campus would be barrier-free to ensure easy movement for the differently abled persons.

Minister for Science and Technology Dr. Harsh Vardhan, while laying the foundation stone for the new campus, expressed confidence that it would turn out to be an iconic building, reflecting the role being played by Indian science and technology in the socio-economic development of the country.

DST Secretary Dr. Ashutosh Sharma said the campus would be built on a plot of about nearly nine acres, with a ground coverage of 22 percent and a green cover of 52 percent. The complex will have a total office space measuring 16,500 sq.m.

Among other things, the campus would feature an auditorium with a capacity for 500 and a bank and a post office. The parking lot would be able to accommodate about 640 vehicles on surface and basement.

The campus will come up in two phases. In the first phase, two blocks would be constructed with five floors each. One block would house offices of DST and DSIR and other block offices of Science and Engineering Research Board, Vigyan Prasar, Technology Information, Forecasting, and Assessment Council (TIFAC), and Technology Development Board. In the second phase, the auditorium and other facilities would be constructed. The project will be implemented by Ircon Infra and Services.

(India Science Wire)

By Sunderarajan Padmanabhan

स्पंदन फीचर्स

विकास की बात सबके साथ

आधारभूत विज्ञान आधारित नवाचार पर हो विज्ञान और प्रौद्योगिकी का जोर

नवनीत कुमार गुप्ता @NavneetKumarGu8



स्वतंत्रता के बाद से ही देश के नीति-निर्माताओं ने विज्ञान एवं प्रौद्योगिकी के महत्व को समझ लिया था। अब आवश्यकता है कि वैज्ञानिक अपने शोध कार्य का लक्ष्य सामाजिक समस्याओं के समाधान के लिए निश्चित करें। वैज्ञानिकों और शोध संस्थाओं को लोगों की समस्याओं के समाधान से जुड़े लक्ष्य निर्धारित करने होंगे और उद्योगों को विज्ञान की ओर आकर्षित करना होगा। शोध को समाज की जरूरतों के मुताबिक भी ढालना मौजूदा वक्त की जरूरत है।

विज्ञान और प्रौद्योगिकी विभाग के 47वें स्थापना दिवस के अवसर पर नई दिल्ली में बृहस्पतिवार को आयोजित एक संगोष्ठी में ये बातें नीति आयोग के सदस्य एवं डीआरडीओ के पूर्व सचिव वी.के. सारस्वत ने कही हैं। वह नई दिल्ली के टेक्नोलॉजी भवन में विज्ञान और प्रौद्योगिकी विभाग (डीएसटी) द्वारा आयोजित संगोष्ठी में बोल रहे थे।

इस अवसर बोलते हुए प्रसिद्ध वैज्ञानिक प्रोफेसर एम.एम. शर्मा ने आधारभूत विज्ञान से संबंधित शोध के महत्व को रेखांकित करते हुए कहा कि "किसी भी नई खोज की बुनियाद विज्ञान में आधारभूत शोध ही होता है। इसलिए नवाचार के साथ आधारभूत विज्ञान में शोध कार्यों को बढ़ावा देना होगा। शोध के आरंभ में ही परिणाम का प्रश्न नहीं करना चाहिए। ऐसे अनेक उदाहरण हैं, जिनमें विज्ञान के क्षेत्र में शोध संपन्न होने के बाद कई वर्षों बाद भी उस शोध पर आधारित नवाचार होते रहे हैं।"

विज्ञान और प्रौद्योगिकी विभाग के सचिव प्रोफेसर आशुतोष शर्मा ने कहा कि "विगत चार वर्षों में विज्ञान और प्रौद्योगिकी क्षेत्र का बजट लगभग दोगुना हुआ है। शोधकर्ताओं को पोस्ट डॉक्टरेट के लिए प्रोत्साहित करने के लिए नई योजना आरंभ की गयी है। शोधकर्ताओं को समाज से जोड़ने के लिए पीएचडी छात्रों को अपने शोध क्षेत्र से संबंधित लोकप्रिय लेख लिखने के लिए प्रेरित किया जा रहा है। नवोन्मेष को बढ़ावा देने संबंधी योजनाएं आरंभ की गयी हैं। कई अंतराष्ट्रीय परियोजनाओं में भागीदारी भी की गई है, जिनमें तीस मीटर टेलिस्कोप, लिगो एवं लार्ज हेड्रान कोलाइडर प्रमुख हैं।"

विज्ञान और प्रौद्योगिकी विभाग के पूर्व सचिव प्रोफेसर पी. रामाराव ने अंतर्विषयक और अंतर-संस्थानिक तालमेल पर जोर देते हुए कहा कि अकादमिक और औद्योगिक संबंधों को बढ़ावा देना जरूरी है। प्रसिद्ध नाभिकीय वैज्ञानिक एवं विज्ञान और प्रौद्योगिकी विभाग के पूर्व सचिव प्रोफेसर वी.एस. रामामूर्ति ने कहा कि भारत को अंतर-विश्वविद्यालय जैसे अन्य संस्थानों की आवश्यकता है, इससे उच्च स्तरीय शोध के लिए वैज्ञानिक शोध संस्थान मिलकर कार्य कर सकेंगे। पुणे स्थित अंतर-विश्वविद्यालय केंद्र खगोल-विज्ञान और खगोल भौतिकी (आयुका) का उदाहरण देते हुए उन्होंने कहा कि इस संस्थान के

वैज्ञानिकों ने गुरुत्वीय तरंगों की शोध में महत्वपूर्ण भूमिका निभाते हुए अंतरराष्ट्रीय स्तर पर देश को ख्याति दिलायी है। हमें ऐसे ही और संस्थानों की आवश्यकता है, जहां शोध के लिए उत्कृष्ट माहौल हो।

भारतीय प्रौद्योगिकी संस्थान, खड़गपुर के निदेशक प्रोफेसर प्रार्था प्रतिम चक्रवर्ती ने संगोष्ठी में बोलते हुए कहा कि “वैज्ञानिकों को समाज की समस्याओं को समझकर उनका समाधान करने के लिए प्रयास करना होगा। इसके साथ ही उन्होंने समाज में वैज्ञानिक दृष्टिकोण के प्रसार की भी बात कही। उन्होंने इस बात पर भी जोर दिया की विज्ञान के क्षेत्र में शोध कार्य के लिए आवेदनों को प्रस्तुत करने एवं समीक्षा में डिजिटल प्रणाली का उपयोग होना चाहिए, जिससे समय की बचत होगी और दोहराव की संभावना भी कम होगी।”

भारतीय प्रौद्योगिकी संस्थान, दिल्ली के निदेशक प्रोफेसर रामगोपाल राव ने कहा कि “भारत को विज्ञान और प्रौद्योगिकी के क्षेत्र में निरंतर आगे बढ़ते रहने के लिए शोध पत्रों की संख्या बढ़ाने के स्थान पर शोध के प्रभाव को व्यापक रूप देने की दिशा में कार्य करना होगा। सशक्त नीतियां बनाकर, अधिक छात्रवृत्तियां देकर, उच्च स्तरीय सुविधाएं एवं उपकरण उपलब्ध कराकर विज्ञान में शोध कार्यो को बढ़ावा देने और वैज्ञानिकों को बेहतरीन शोध कार्यो के लिए सक्षम बनाने में मदद मिल सकती है।”

(इंडिया साइंस वायर)

प्रभा साक्षी

विज्ञान और प्रौद्योगिकी विभाग को जल्द मिलेगा नया घर

By उमाशंकर मिश्र | Publish Date: May 4 2018 5:44PM



नई दिल्ली, (इंडिया साइंस वायर): सामाजिक एवं आर्थिक विकास के लिए आवश्यक वैज्ञानिक उपलब्धियां हासिल करने के लिए अनुकूल माहौल और बेहतर सुविधाओं के महत्व को नकारा नहीं जा सकता। इसी बात को ध्यान में रखते हुए विज्ञान और प्रौद्योगिकी मंत्रालय अपने दो प्रमुख विभागों विज्ञान और प्रौद्योगिकी विभाग (डीएसटी) एवं वैज्ञानिक और औद्योगिक अनुसंधान विभाग (डीएसआईआर) तथा इनके अंतर्गत कार्यरत स्वायत्त संस्थानों के लिए आधुनिक भवन का निर्माण करने जा रहा है। इस भवन की आधारशिला बृहस्पतिवार को विज्ञान और प्रौद्योगिकी विभाग के 47वें स्थापना दिवस के अवसर केंद्रीय मंत्री डॉ. हर्ष वर्धन ने रखी है।

इस अवसर बोलते हुए डॉ. हर्ष वर्धन ने कहा कि “मुझे उम्मीद है कि यह नया परिसर देश में सामाजिक एवं आर्थिक क्षेत्र में भारतीय विज्ञान और प्रौद्योगिकी की भूमिका को प्रदर्शित करने वाले एक प्रतीक के रूप में स्थापित होगा।” नई दिल्ली के कुतुब इंस्टीट्यूशनल एरिया में इस भवन का निर्माण करीब 192 करोड़ रुपये की लागत से किया जाएगा।

डीएसटी सचिव प्रोफेसर आशुतोष शर्मा ने बताया कि “नए भवन का निर्माण करीब नौ एकड़ क्षेत्र में किया जाएगा, जिसमें भूमि का 22 प्रतिशत हिस्सा घिरा होगा, जबकि हरित क्षेत्र 52 प्रतिशत होगा। इस परिसर में कुल 16,500 वर्ग मीटर क्षेत्र में कार्यालय होंगे।”

नया भवन पूरी तरह से पर्यावरण हितैषी होगा। इसमें लगे वाटर ट्रीटमेंट प्लांट के जरिये प्रतिदिन एक लाख लीटर सीवेज वाटर का उपचार करके उसका उपयोग बागवानी के लिए किया जाएगा। बाहरी क्षेत्र और अग्रभाग में पूरी तरह से एलईडी लाइट का उपयोग किया जाएगा। इसके अलावा भूजल

पुनर्भरण के लिए वर्षा जल संचयन पिट और 300 किलोवाट क्षमता की ग्रिड इंटरैक्टिव सौर ऊर्जा उत्पादन प्रणाली भी स्थापित की जाएगी।

इस नए भवन के परिसर के केंद्र में कलाकृतियों से सजा हरा-भरा प्रांगण भी होगा। इस परिसर का निर्माण दिव्यांगों को ध्यान में रखकर किया जाएगा, ताकि उन्हें आने-जाने में परेशानी का सामना न करना पड़े। इसके अतिरिक्त इस परिसर में 500 लोगों की क्षमता वाला एक ऑडिटोरियम, एक बैंक और एक पोस्ट ऑफिस भी होगा। इस परिसर में भूतल और सतह को मिलाकर कुल 640 वाहन खड़े किए जाने की क्षमता होगी।

परिसर का निर्माण दो चरणों में पूरा होगा। पहले चरण में पांच मंजिला दो ब्लॉक बनाए जाएंगे। एक ब्लॉक में डीएसटी और डीएसआईआर का ऑफिस होगा, वहीं दूसरे ब्लॉक में साइंस ऐंड इंजीनियरिंग रिसर्च बोर्ड, विज्ञान प्रसार, टाइफेक, टेक्नोलॉजी डेवलपमेंट बोर्ड का ऑफिस होगा। दूसरे चरण में ऑडिटोरियम और अन्य सुविधाओं का निर्माण किया जाएगा। इस परियोजना को मूर्त रूप देने के लिए इरकॉन इन्फ्रा ऐंड सर्विसेज के साथ समझौता किया गया है।

(इंडिया साइंस वायर)



EASTERN MIRROR

Research management critical for Indian labs to become competitive

May 6, 2018 / Comments Off on Research management critical for Indian labs to become competitive

New Delhi, May 4 (India Science Wire): Attired in white lab coat, mixing oddly colored chemicals or observing tiny creatures through microscope and working with sophisticated instruments. That's how a typical scientist may look like in popular imagination.

But that's not the full picture. In reality, academic researchers in institutes and universities have to perform far more duties than just handling experimental work. They have to look after administrative and management part of research grants, apart from technical aspects. This entails keeping track of research funding opportunities, fellowships, budgets, processing bills, preparing utilization certificates and so on. Such an over-burdened scientific mind, therefore, often finds it difficult to pursue and delve deep into intricacies of science which is primary task of working scientists.

A solution to the problem is to create a cadre of individuals who can take care of research management tasks in research institutions. Such research managers can lessen administrative load on scientists by taking over responsibilities such as finding and managing national and international funding grants, stimulating collaborations with other institutions, managing policy and regulatory approvals and coordinating with technology transfer and intellectual property professionals. They can also help increase the visibility of their organization by communicating their research outputs globally. Such positions are common in institutes in the developed world.

To bridge the gap, Wellcome Trust/DBT India Alliance has launched an India Research Management Initiative (IRMI). Under this, India Alliance will work with academic institutions to identify their research management gaps and develop a mechanism for training

and deploying professionals who can utilize their scientific backgrounds to effectively communicate and manage research projects.

“Research management is conducted at the boundary of research and other disciplines such as business and communications. The long-term goal of IRMI is to generate successful research managers across the country and connect them to a professional network. “

“Research management is conducted at the boundary of research and other disciplines such as business and communications. The long-term goal of IRMI is to generate successful research managers across the country and connect them to a professional network. Such a network will be hugely enabling for their career growth and promoting their professional competence,” explained Dr. Savita Ayyar, consultant at the India Alliance, while speaking to India Science Wire.

The programme is currently being implemented as a pilot project to put together a detailed account of how research is being managed at different institutions and identify gaps in the system. Recently, a sharing session was organized at the Indian Institute of Science Education and Research (IISER) Pune, which included members of the scientific leadership at the participating institutions along with research managers.

The format of the workshop allowed for in-depth sharing of ideas, along with a detailing of the barriers to implementation. More such workshops are planned in other parts of the country. The aim is to get a comprehensive view of research management in India so as to guide future policy and specific funding opportunities via the India Alliance.

“We believe that efficient research management structures are needed for Indian institutions to become globally competitive. This initiative aims to catalyze that. It also supports our mission of building excellence in Indian science”, said Dr. Shahid Jameel, CEO of the India Alliance. Institutions intending to participate in IRMI can register at the India Alliance website.

Western Ghats biodiversity is a significant source of moisture for monsoon

India Science Wire 2018-05-07 04:46:29.0

A new study on impact of biodiversity of Western Ghats on monsoon points out the evapotranspiration from vegetation accounts for one quarter of the rainfall over peninsular India. The monsoon occurs in weeks of rain known as the active period followed by several days or weeks of mini-droughts known as the break period. Model simulations show the moisture supply from Western Ghats is critical during the break period since it accounts for up to 50% of the total rainfall over Tamil Nadu.



Western Ghats (Image courtesy: Wikimedia Commons)

Pune (*ISW*) - The mountain range that runs along the west coast of peninsular India from Tamil Nadu through Kerala, Karnataka, and Goa to Maharashtra is known as the Western Ghats and is very well known for its majestic beauty. It is also among the top eight biodiversity hotspots in the world. The Western Ghats host over 400 species and 7 distinct vegetation types.

The Western Ghats are often in the news due to constant threat to their biodiversity. Forest cover has declined by up to 50% in parts of Uttara Kannada district of Karnataka and the evergreens in Kerala are facing a threat of extinction. The overall deforestation is reported to be accelerating over recent decades. In the meantime, water distribution remains a contentious issue among states in the region. What has not been understood clearly is just how critical a source of moisture the greenery of the Western Ghats is for some of the water-stressed states.

The Ghats run perpendicular to the moisture-laden southwest monsoon winds gusting in from the Arabian Sea, forcing the winds to climb the mountain range to get over to the other side. This climb leads to an expansion of the winds since pressure decreases with height in the atmosphere and the expansion leads to a cooling and thus condensation of the moisture, resulting in annual rainfall ranging from 2000 mm to nearly 7800 mm. If you are hiking the Ghats during the rainy season and happen to catch one of the break periods in the monsoon, then you will see water vapor pouring out of lush green vegetation like steam over a hot cup of coffee.

Studies on the impact of deforestation have mostly focused on the Amazon and the results have shown dramatic local and remote effects of deforesting the Amazon. It turns out that the vegetation over the Ghats also would have detrimental effects on rainfall over India.

In this study, a regional atmospheric model which includes the representation of land and vegetation has been employed to conduct monsoon simulations for the period 1990-2015. A regional model can be computationally efficient due to its limited simulation domain and can be run at relatively high grid resolutions compared to the global climate models. This high grid resolution allows features like the Western Ghats and their vegetation types as well as agricultural and urban landscapes over the rest of India, to be represented more accurately compared to relatively lower-resolution global models. The leaf and stem area and canopy heights of vegetation and their evapotranspiration and energy exchange with the atmosphere are captured accurately by the model. The model simulations can then be performed with all the vegetation included and by denuding the Western Ghats partially or totally.

The simulation period chosen includes sufficient number of seasons, active/break periods as well as normal and deficit monsoon years to allow us to confidently assess the moisture contribution of the Western Ghats vegetation to rainfall over interior India. Earlier studies on moisture sources for the Indian monsoon led by Amey Pathak of IITB had pointed out that the vast Ganga basin with its river water and agricultural activities, acts not only as a major source of moisture for itself in terms local evaporation and recycled rain but also as a significant supplier of moisture for rain over northeast India.

The new study points out that the evapotranspiration from the vegetation over the Western Ghats accounts for one quarter of the rainfall over peninsular India. This is highly significant. For example, Tamil Nadu receives a total annual rainfall of 960 mm but only 33% of that falls during the summer monsoon. The summer rainfall is thus critical for the Kharif crop season over Tamil Nadu.

The monsoon occurs in weeks of rain known as the active period followed by several days or weeks of mini-droughts known as the break period. Model simulations show that the moisture supply from the Western Ghats is critical during the break period since it accounts for up to 50% of the total rainfall over the state of Tamil Nadu. The evergreen broadleaf forests in the southern Western Ghats are a significant bucket of moisture for rainfall over Tamil Nadu. The monsoon during 1993, 1999 and 2002 were severely deficient over Tamil Nadu and the Kaveri basin. Model simulations attribute up to 50% of the rainfall during these deficit years to be due to the moisture supplied by the Western Ghats. It is clear that the thick vegetation cover over the Ghats accumulates moisture and acts like a capacitor to release the moisture to peninsular India during dry periods – be they the mini-droughts or break periods during a normal monsoon or the extended break periods associated with drought years.

The study also shows that any reduction in rainfall due to deforestation of the Western Ghats would lead to a warming of peninsular India as well. This can be expected since the monsoon rains typically bring a significant cooling over India by dragging down the dry cool air from the upper atmosphere. This cooling is a lifesaving relief from the scorching pre-monsoon temperatures and heatwaves.

Continued deforestation is of great concern for the ecological community due to the loss of precious flora and fauna. This study puts a finer point on the value of the Western Ghats biodiversity as a significant source of moisture for rainfall over parts of India that are constantly struggling for water for agriculture as well as domestic and industrial use. The battle cry for protecting biodiversity hotspots and the overall forest cover over the Western Ghats just got louder.

Source: *India Science Wire*

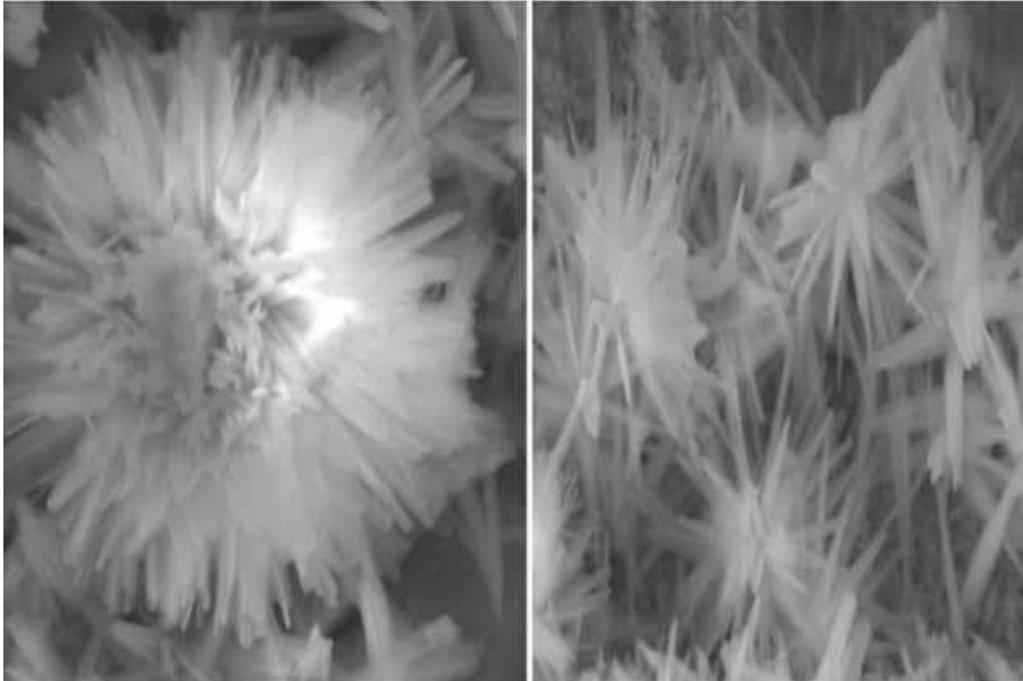
Image courtesy: *Wikimedia Commons*

Outlook

07 MAY 2018 Last Updated at 7:33 PM FEATURES

Creating A Botanical Garden On Pinhead

DR HARDEV SINGH VIRK



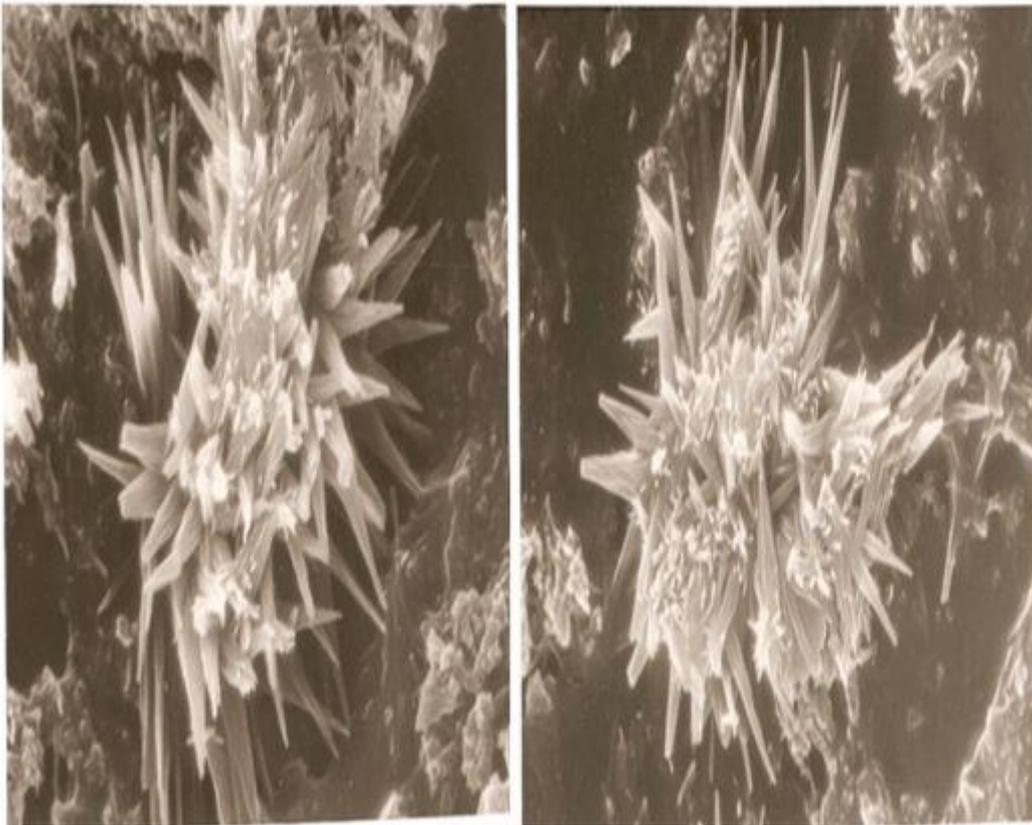
It is almost like going around a botanical garden full of exotic flowers, some of which may look similar to lilies and marigold. But this garden of nanoflowers can't be relished with naked eyes. You need powerful electron microscopes to wander in the ultra tiny world of nanoflowers. A typical nanoflower may be 1000 times thinner than a human hair.

The emerging science of nanoflowers is attracting the attention of scientists and industry because of their high stability and enhanced efficiency. Nanoflowers can find applications in optoelectronics devices or sensors, catalysis and solar cells. It has been discovered that nanoflowers have great potential for possible applications in nanotechnology, for example, as sensors for hydrogen peroxide and glucose, as well as for field emission properties.

Researchers across the world have obtained a series of nanoflowers and nanoflower-like structures by varying temperature, reagent ratio and other reaction conditions. Nanoflower structure primarily consists of simple nanostructures such as nanorods, nanowalls, or nanowires.

Nanoflowers of almost all metals have been reported in the form of elemental nanoflowers; metal oxide nanoflowers; nanoflowers of hydroxides and oxosalts; sulphide, selenide and telluride nanoflowers; nitride and phosphide nanoflowers; as also nanoflowers formed by organic and coordination compounds.

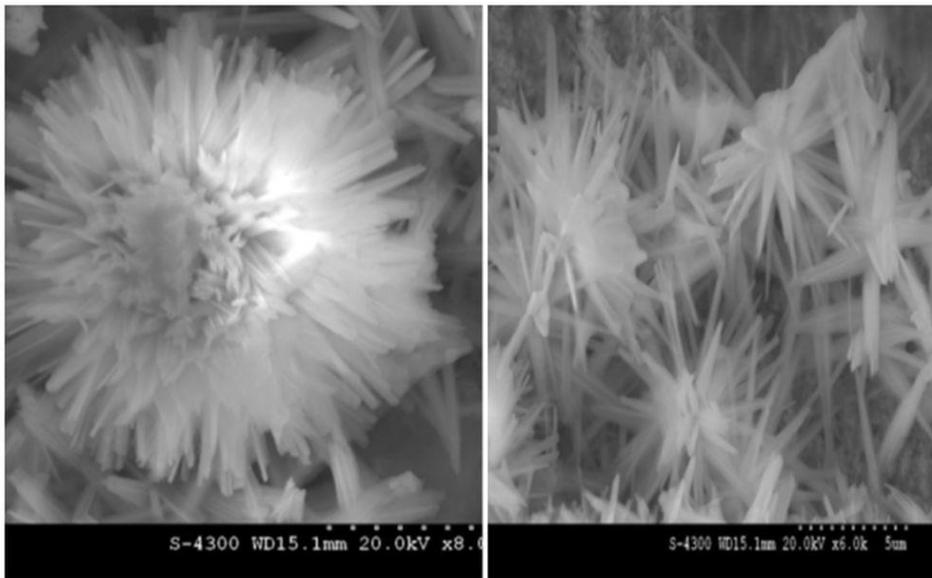
During 2008-11, our laboratory in DAV Institute of Engineering and Technology, Jalandhar was involved in creating nanocrystals, quantum dots, nanorods and nanowires of various dimensions. Nanoflower fabrication was not on our agenda. This interesting phenomenon was a by-product of our Nanowire fabrication. When we failed to produce Nanowires, due to some unintended discrepancy in experimental set up, we were rewarded by exquisite and exotic patterns of copper appearing as nanoflowers.



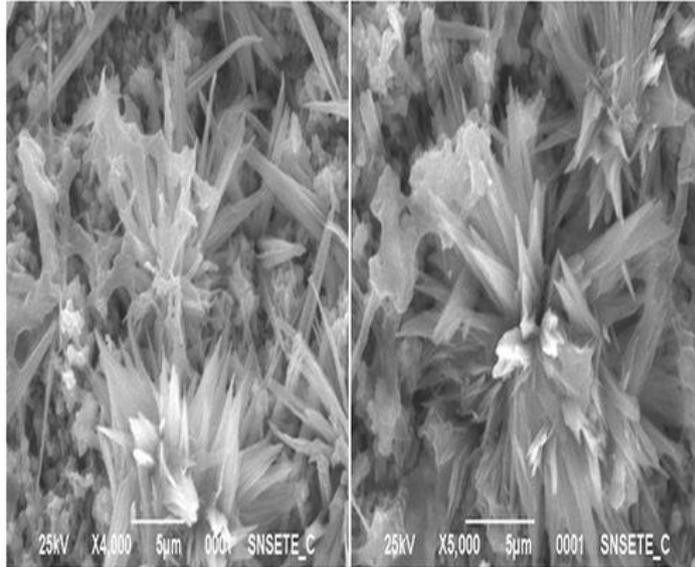
SEM micrographs show identical patterns of Copper nanoflowers grown in polymer template (100 nm pore dia.)



SEM micrograph of Yucca-like copper nanoflowers grown in polymer template



SEM micrographs of marigold copper nanoflowers grown in polymer template



FESEM micrographs of Lilly-like copper nanoflowers grown in anodic alumina template (200 nm pore dia.)

Electro-deposition technique used in our experiment is similar in principle to that used for the electroplating process. Commercially available polycarbonate membranes of 25 mm diameter with pore density of 0.1 billion pores per square centimetre and pore diameter of 100 nm were selected for this experiment. Anodic alumina membranes having a pore density of one billion pores per square centimetre and an average pore diameter of 200 nm were used as an alternative route for creating nanoflowers.

Electrochemical cell used for growth of Nanowires was fabricated in our workshop using Perspex sheets. A copper rod of 0.3 cm diameter was used as an anode. The cathode consists of copper foil attached to polymer template by an adhesive tape of good conductivity.

The electrolyte was prepared at room temperature by adding 20 gram of Copper Sulphate in 100 cc of distilled water. A few drops of dilute Sulphuric acid was added to make it conducting. The inter-electrode distance was kept 0.7 cm and a current of 2 milliampere was applied for 10 minutes. The polymer template was dissolved in dichloromethane to liberate copper nanoflowers from the host matrix. When experiment was repeated using anodic alumina, Copper nanowires were produced in the centre of the template and nanoflowers appeared on the periphery, perhaps due to poor contact. The Scanning Electron Microscope was used to record top and side views of grown nanoflowers under different magnifications.

So far, there is no specific theory to explain exotic patterns developed during electro-deposition of copper in anodic alumina or polymer templates. A speculative explanation has

been provided by some researchers on the basis of over-deposition. During the growth of copper nanowires in the template pores, the current remains nearly stable until the wires arrive at the template surface. If the electro-deposition process is not stopped at this stage, the current keeps rising gradually leading to over-deposition of copper.

In our experiments, it was observed that the growth of nanoflowers depends on two factors: cathode over-potential and conductivity of the cathode surface. If conducting film is used for the cathode surface, copper ions will tend to deposit into nano-channels of polymer template, otherwise they tend to grow laterally on the cathode surface. The deposition of copper takes place only when the potential of the cathode is lower than the equilibrium electrode potential of the electrolytic cell; hence, a certain magnitude of cathode over-potential is necessary.

It has been observed that the best flower patterns are created by electro-deposition of copper in polymer templates. Due to poor conductivity of polymer, free flow of copper ions into pores of template to form Nanowires is restricted, resulting in the over-deposition at the cathode surface in the form of nanoflowers. The beauty of these experiments is that no identical patterns are produced on repeating the experiment. It remains an enigma and defies scientific explanation.

In case of anodic alumina template, copper nanowires were grown in central region and nanoflowers in the peripheral zone. It clearly proves the hypothesis of differential deposition of copper on the cathode surface. It is difficult to determine the exact conditions under which nanoflowers are synthesized along with nanowires.

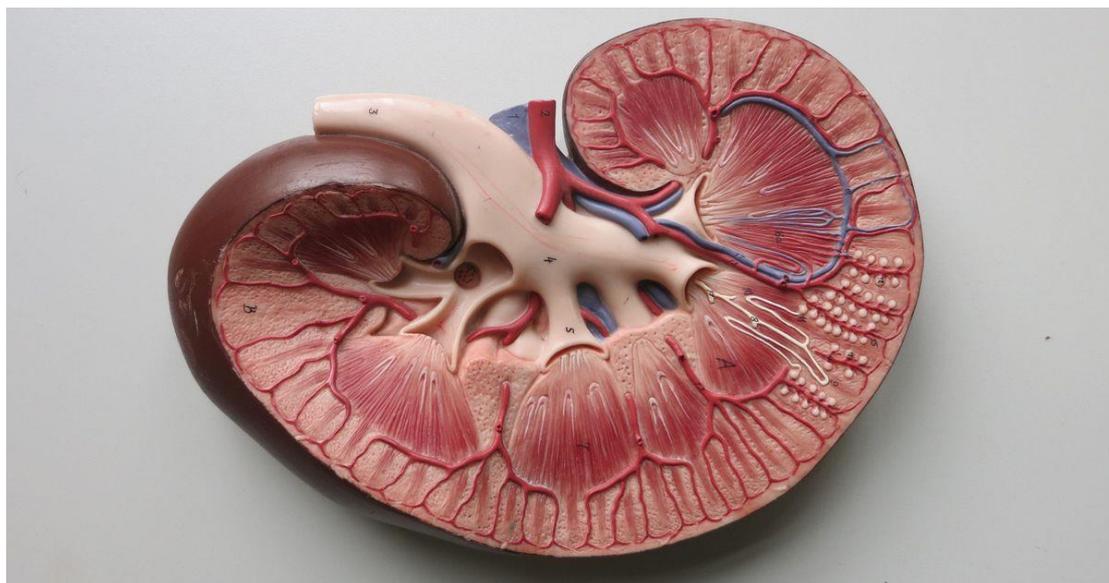
Our investigations reveal that chance plays a predominant role in growth of nanoflowers. The most disturbing feature of our study is that different types of nanostructures are created under similar experimental conditions. Hence, one may conclude that fabrication of nanoflowers is an art and lacks scientific explanation. However, there is one satisfaction that all these exotic patterns find some analogue in nature. (India Science Wire)

The writer is a professor of eminence at Punjabi University, Patiala

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Lab notes: Electro-chemical method to detect chronic kidney disease early

Detection of CKD is often serendipitous and is normally detected by hospital-based urine and blood tests.



[John Campbell/Flickr \[Licenced under CC BY 2.0\]](#)

May 08, 2018 · 05:30 am [Umashankar Mishra](#)

Indian researchers have developed a technique which can potentially help in rapid detection of chronic kidney disease or CKD. It is a highly sensitive electro-chemical technique, which can be used to detect different stages of the disease.

The technique has been put together by researchers of the Council of Scientific and Industrial Research's New Delhi-based Institute of Genomics and Integrative Biology and Amity University, Rajasthan.

It has been developed by modifying a multi-walled carbon nanotube electrode with capture protein papain via covalent immobilisation. The binding of the probe to the electrode was confirmed by various microscopic and spectroscopic methods. Cystatin C, a CKD-specific marker can bind to the capture molecule producing variations in the electronic transitions occurring through the surface modified electrode.

Dr Manali Datta, researcher at Amity University who led the study, said, "This technique could detect Cystatin C concentrations corresponding to baseline as well as different stages of CKD. Specificity of the sensor was tested against creatinine, albumin, and gliadin and was found to be highly specific for Cystatin C."

“The sensor,” she explained, “was tested with spiked samples of urine and was found to give a good accuracy rate. It has been tested in varying pH levels and is able to detect as low as 6 microgram of CKD specific marker per liter of urine.”

CKD is characterised by gradual loss of kidney function due to degeneration of kidney tubules. Patients with diabetes, hypertension, cardiovascular disease or hormonal imbalances have a higher risk of developing CKD than those without these complications. CKD is divided into five stages based on severity and deterioration may happen over a period of months to years.

Detection of CKD is often serendipitous and is normally detected by hospital-based urine and blood tests. These tests monitor the protein and creatinine levels in the urine. One of the main disadvantages is that there is a blind spot for serum creatinine testing. The kidney function has to come down by 50% if it needs to be detected and this poses a serious threat as required treatment cannot be given at the right time and it could be fatal. Hence there is a need for a more suitable method to estimate the severity of the disease, researchers said.

Considering that 72 million diabetics, 110 million hypertensive patients, and 40 million suffering from cardiovascular diseases in India are prone to get CKD, it becomes necessary to develop a point of care diagnostics for the susceptible population. The new technique has the potential to be developed into a point of care device.

“If CKD is detected at an early stage (Stage 1 or 2), mere modifications in diet and intake of ACE inhibitors may prevent the progression to end stage renal disease”, said Datta.

The research team included Professor Ashok Kumar of IGIB and Dignya Desai of Amity University, Rajasthan. Study has been published in a recent issue of journal *Biosensors and Bioelectronics*.

This article was first published by India Science Wire.

दैनिक जागरण

मंगलवार

8 मई 2018

उपलब्धि

भारतीय वैज्ञानिकों को मिली अत्यंत संवेदनशील इलेक्ट्रो-केमिकल सेंसर आधारित तकनीक विकसित करने में सफलता, समय रहते रोगों की पहचान से उपचार में मिलेगी मदद



किडनी रोगों की पहचान के लिए नई तकनीक

नई दिल्ली, आइएसडब्ल्यू : भारतीय शोधकर्ताओं ने एक ऐसी तकनीक विकसित की है, जो दीर्घकालिक किडनी रोगों की समय रहते पहचान में मददगार हो सकती है। इसे विकसित करने वाले शोधकर्ताओं के अनुसार, यह अत्यंत संवेदनशील इलेक्ट्रो-केमिकल सेंसर आधारित तकनीक है, जिसका उपयोग किडनी रोगों के विभिन्न स्तरों का पता लगाने के लिए किया जा सकेगा। समय रहते रोगों की पहचान से उपचार में मदद मिल सकेगी।

नई दिल्ली स्थित इंस्टीट्यूट ऑफ जैनोंमिक्स एंड इंटीग्रेटिव बायोलॉजी और एमिटी विश्वविद्यालय, राजस्थान के शोधकर्ताओं ने कैप्चर प्रोटीन पैपेन के साथ बहु-भित्तीय (मल्टीवैलेंट) कार्बन नैनोट्यूब इलेक्ट्रोड में बदलाव कर सहसंयोजी आवरणों के स्थिरीकरण के जरिये एक नया इलेक्ट्रो-केमिकल सेंसर विकसित किया है। शोध के दौरान विभिन्न माइक्रोस्कोपिक और स्पेक्ट्रोस्कोपिक पद्धतियों से इलेक्ट्रोड परीक्षण बंध की पुष्टि की गई है।

किडनी रोगों से संबंधित मार्कर सिस्टेटिन-सी संशोधित इलेक्ट्रोड के जरिये होने वाले इलेक्ट्रॉनिक संचरण में कैप्चर अणु उत्पादक परिवर्तनों को आबंध कर सकता है। सिस्टेटिन-सी को किडनी रोगों के मार्कर के रूप में नेशनल किडनी फाउंडेशन द्वारा



प्रमाणित किया गया है। मार्कर उन जैविक संकेतकों को कहा जाता है, जिनकी मदद से परीक्षण के दौरान रोगों की पहचान की जाती है।

क्रिएटिनिन, एल्ब्यूमिन और ग्लायसिन पर इसका परीक्षण करने पर वैज्ञानिकों ने इस सेंसर को सिस्टेटिन-सी के प्रति सबसे अधिक प्रभावी पाया है। सेंसर का परीक्षण मलमूत्र के नमूने के साथ करने पर इसकी विशुद्धता की दर काफी अधिक पाई गई है।

अध्ययनकर्ताओं में शामिल एमिटी विश्वविद्यालय की शोधकर्ता डॉ. मनाली दत्ता ने बताया कि विभिन्न पीएच स्तरों पर इस सेंसर का परीक्षण किया गया है और यह प्रति लीटर मलमूत्र में किडनी रोगों से जुड़े विशिष्ट मार्कर की छह माइक्रोग्राम तक न्यूनतम मात्रा की पहचान कर सकता है। यह सेंसर आधार-रेखा के अनुरूप सिस्टेटिन-सी की सांद्रता के साथ-साथ

किडनी संबंधित रोगों के विभिन्न स्तरों का पता लगाने में सक्षम है।

वृक नलिका में गड़बड़ी के कारण किडनी की कार्यप्रणाली में लगातार होने वाली गिरावट को किडनी की दीर्घकालिक बीमारी के रूप में जाना जाता है। डायबिटीज, हाइपरटेंशन, हृदय रोग और हार्मोनल असंतुलन के कारण किडनी संबंधी रोगों का खतरा बढ़ जाता है। बीमारी की गंभीरता के आधार पर किडनी रोगों को पांच स्तरों में बांटा गया है। अस्पतालों में किए जाने वाले परीक्षणों में आमतौर पर दीर्घकालिक किडनी रोगों के तीसरे से पांचवें स्तर की पहचान हो पाती है। तब तक बीमारी उग्र रूप धारण कर चुकी होती है। किडनी रोगों की पहचान आमतौर पर अस्पताल में मलमूत्र और रक्त परीक्षण के जरिये की जाती है। इन परीक्षणों में मलमूत्र में प्रोटीन और क्रिएटिनिन के स्तर की जांच की जाती है, लेकिन सीरम क्रिएटिनिन के उपयोग से खतरे का अंदेशा बना रहता है क्योंकि किडनी की कार्यप्रणाली आमतौर पर 50 प्रतिशत कम होने पर परीक्षण से बीमारी का पता लग पाता है। ऐसे में सही समय पर उपयुक्त उपचार मरीज को नहीं मिल पाता, जो उसके लिए जानलेवा साबित होता है। इसलिए बीमारी की गंभीरता का पता लगाने के लिए एक सटीक पद्धति की आवश्यकता है।



Mapping the air pollution sources in Delhi

By Dinesh C Sharma

Published on 8, May, 2018

A group of scientists and students are braving heat and dust this summer in the national capital to map all possible sources of air pollution, so that by winter this year we can get a fair idea of different sources of pollution in the city.

Ground level data about emissions from as many as 26 different sources of pollution is being collected throughout the city, as part of a three-month campaign to prepare an emission inventory. The last such exercise was undertaken in 2010 just before the Commonwealth Games. Since then significant changes have occurred in land use and demography. Many new sources, which were earlier not taken seriously or ignored, will now be quantified.

While industry and transport sectors are apparent sources of air pollution, there are scores of other contributors to deteriorating air quality. Preparing a detailed emission inventory can give a clearer picture, instead of the 'source apportionment' approach.

“Emission inventory is a scientific way to identify aggregated local source contribution and their region specific spatial distribution within a confined boundary. It is more effective tool to identify hot spots and plan control measures,” explained Prof Gufran Beig, Project Director, SAFAR at IITM, while speaking to India Science Wire. The emission inventory campaign has been mounted run by Indian Institute of Tropical Meteorology (IITM) Pune under the Ministry of Earth Sciences.

The data being collected promises to be more accurate than what was collected in 2010 because it will include all possible sources of emissions – from crop burning to wood burning in crematoria - and also because of finer grids in which it is being collected. The city has been divided into grids measuring 400 meter X 400 meters. In all, there are 12,000 such grids. Of them data is being collected from 1000 grids.

In each of the grids, activities contributing to air pollution will be mapped. In each grid, pollution will be mapped in terms of sources such as slums, small scale industries, road conditions, traffic congestion, vendors, population density, vehicle density, road conditions and potential of dust lifting based on paved and unpaved areas. The new sectors and factors, which are being targeted for mapping, include condition of roads, pattern of transport flow from surrounding regions, construction activity, aviation, practices of immigrant workers and changing lifestyles, cooking habit etc.

The survey also covers emissions due to crop burning, solid waste burning and use of diesel generators. For the transport sector, primary and secondary data will be collected about vehicle density, vehicle kilometres travelled per day, traffic composition, age of vehicle and date of purchase, fuel used and fuel type, use of vehicle (hours per day), number of registered vehicles and existing vehicle technology.

“Once we have ward-wise and even smaller level data sets which could be mapped in terms of defined data available for broader boundaries, we will use Geographical Information System (GIS)-based statistical model with inputs from remote sensing satellite images as well as commercially available Google Live maps to develop the inventory. It will thus reflect both primary and secondary data sets for each grid,” said Prof Gufran Beig. The emission campaign will be a useful input for the SAFAR air quality forecasting system.

The emission inventory will include pollutants including oxides of nitrogen, carbon monoxide, black carbon, organic carbon, particulate matter (2.5 micron and 10 micron), sulfur dioxide and volatile organic compounds. Mapping will also focus on 35 specific locations where air quality monitoring stations various central and state agencies are located, so that data could be correlated. The final product with 400 m x 400m high-resolution emission inventory and it is expected to be ready before the start of winter when air quality deteriorates drastically in Delhi.

Students and researchers collecting data along with IITM team are from School of Planning and Architecture, Delhi, experts from Utkal University. The Environmental Information System (ENVIS) Resource Partners hub at IITM, Pune, is a partner to this effort.

(This is from a syndicated feed from [India Science Wire](#))

TECH 2

Scientists develop new ceramic-based material that changes shape with electricity

Sunderarajan Padmanabhan May 09, 2018 09:24 AM IST

Researchers at Bengaluru-based Indian Institute of Science have developed piezo-electric material using ceramic. Piezo-electric materials, which change their shape when an electric field is applied, have a wide range of applications from use in inkjet printers to ultrasound machines.



At present, the most effective piezo-electrics are made of materials like quartz in the form of a single crystal. Such materials are more effective because it is possible to induce more strain and bring about greater change in shape in single crystals. But production of single crystals is complicated and costly affair.

The efficiency of a piezoelectric material is measured in terms of electro-strain value, which indicates how much the material can change its shape when an electric field is applied. The highest electro-strain value achieved so far is 1.7 percent obtained in single crystals of lead-based materials, relaxor ferroelectrics. The new material has

an electro strain value of 1.3 percent, according to data published in journal *Nature Materials*.

The material reverts to its normal form when electric field is turned off. A ceramic material is made of tiny, randomly oriented metal oxide crystals or grains. When voltage is applied, areas or domains within each grain try to orient themselves in the direction of the applied field, prompting the grain to change its shape. The extent to which a grain changes shape depends on its “spontaneous lattice strain”. The larger the strain, the more the grain can deform under an electric field. In many piezoelectric ceramics, when the voltage is turned off, the domains are unable to return to their original state. So, when voltage is applied for a second or third time, electro strain reduces drastically. This is not so with the new material.

Researchers prepared a solid solution of compounds — Bismuth Ferrite and Lead Titanate- that had a large spontaneous lattice strain. The domains in this material were immobile. They then chemically modified it by adding varying amounts of lanthanum to make the domains move. At a certain critical concentration of lanthanum, the domains were able to switch back to their original state when the voltage was turned off.

“Our material can be likened to a rubber band, which can be elongated repeatedly each time we stretch. On closer examination, the material showed nanoscale properties that were similar to the high-performance relaxor ferroelectrics”, explained Dr. Rajeev Ranjan, who led the research.

Updated Date: May 09, 2018 09:24 AM

10-05-2018

HEALTH

An isabgol-based wound material to treat diabetic wounds

By JYOTI SINGH



Prof. Vignesh Muthuvijaya with Dr. T. Ponrasu

Treatment of chronic non-healing wounds in diabetes is a major clinical challenge. To address this problem, researchers at Indian Institute of Technology (IIT), Madras have developed a new wound dressing material. They have developed it, using reduced graphene oxide loaded nanocomposite scaffolds and Isabgol.

Wounds in diabetic patients do not heal as rapidly as it would in a normal healthy individual. This leads to chronic non-healing wounds that can result in serious complications like amputations. Some wound dressings for diabetic wounds are commercially available. However, they are very expensive. As the diabetic population in India keeps growing, treating these diabetic wounds will be a major clinical and social challenge.

Speaking with India Science Wire, Prof. Vignesh Muthuvijayan, Assistant Professor, Department of Biotechnology, Bhupat and Jyoti Mehta School of Biosciences, IIT Madras, said, "We have taken reference of a study published in Advanced Healthcare Material Journal, where it has been shown that graphene oxides at certain concentrations have angiogenic properties (the physiological process through which new blood vessels form from pre-existing vessels). We took isabgol (psyllium) as base material and reduced graphene oxide as

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healing wounds that can result in serious complications like amputations. Some wound dressings for diabetic wounds are commercially available. However, they are very expensive. As the diabetic population in India keeps growing, treating these diabetic wounds will be a major clinical and social challenge...

bioactive material. Isabgol was used because it can absorb large quantities of wound exudates, it also provides an ideal moist environment for the wound to heal faster. The Isabgol-reduced graphene oxide nanocomposite that we prepared has shown exciting results in animal studies".

Dr. Muthuvijayan and his team used a convex lens to focus sunlight on graphene oxide to obtain reduced graphene oxide. Then, they loaded these reduced graphene oxide dispersions into a solution of isabgol (psyllium) to obtain the wound dressing scaffolds. Fibroblast cells, responsible for wound healing were used to evaluate the toxicity and bioactivity of these scaffolds on cell attachment, migration and proliferation. The newly developed scaffolds were shown to provide a suitable tissue-friendly environment for the cells and subsequently improve cell proliferation and attachment.

The scaffold also provided an ideal environment to the wounds for the re-growth of damaged skin through proliferated fibroblast cells on the injury site. Histopathology and immunohistochemistry analyses showed that the treatment enhanced new blood vessels formation, collagen synthesis and deposition in treated wounds.

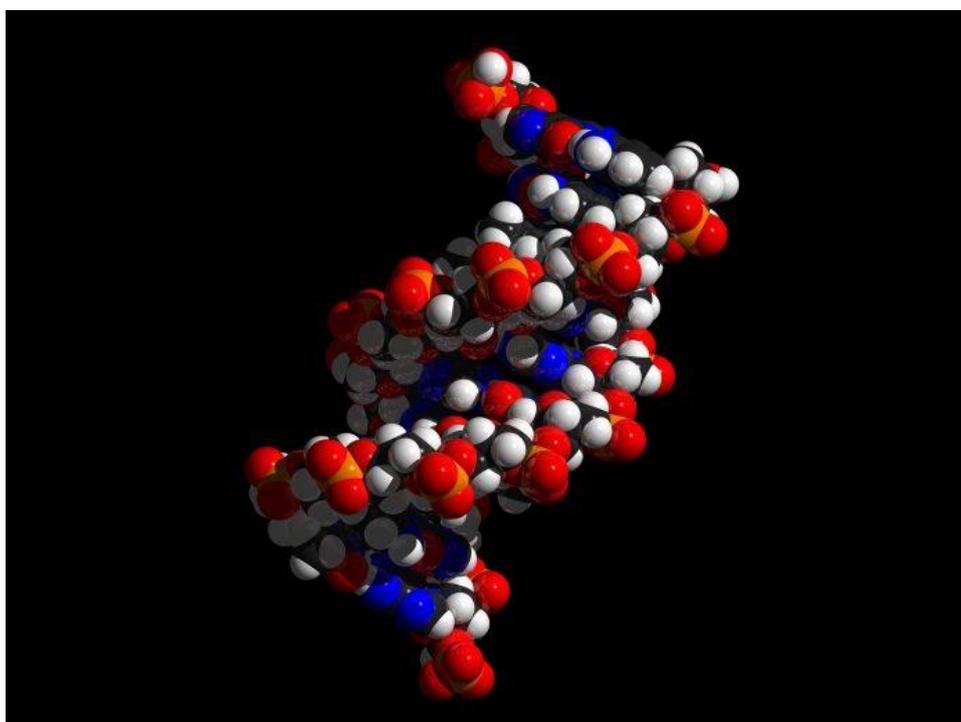
Overall, the research showed that these wound dressings could significantly accelerate healing of both normal and diabetic wounds. The study has been done on rats where the normal wounds treated with the dressings healed in 16 days compared to 23 days in untreated wounds. Similarly, the wounds on diabetic rat treated with the dressings healed in 20 days compared to 26 days in untreated wounds. These scaffolds are easy to prepare, inexpensive, and show excellent healing properties.

The research team includes Dr. T. Ponrasu, Ramya Kannan, Balaji Ramachandran, Ganeshkumar Moorthy and Lonchin Suguna. The research team has published a report on their work in a recent issue of Journal of Colloid and Interface Science. (India Science Wire)

Scientists find synthetic mimic for critical biomolecule

A research team led by Dr Subi J. George and Dr S. Balasubramanian at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, have shown that synthetic molecules can grow and be controlled on similar stimuli such as biological systems

May 10, 2018



[By Ratneshwar Thakur](#)

New Delhi: Biological assemblies are thousands of tiny machineries which play collectively important roles towards maintaining the cellular structure and functions, and many of them even play very critical roles. Self-assembly of these tiny machines requires biological fuel to become operational. Scientists have been trying to figure out how these tiny machines are controlled. This could help in controlling engineered organic designs comparable to natural frameworks.

A research team led by Dr Subi J. George and Dr S. Balasubramanian at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, have shown that synthetic molecules can grow and be controlled on similar stimuli such as biological systems.

In this study, researchers worked on Actin, a protein which frames the contractile fibres of muscle cells. In living system, Actin assembles on its own using its monomer components under the influence of biological fuel Adenosine Triphosphate (ATP). Actin as tiny machine works like treadmill to support cellular movements.



The research team at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore.

The researchers have mimicked ATP-selective actin- like self-assembly in the laboratory very similar to what happens in the natural conditions inside the cells. They could observe monomer subunits undergoing ATP-fuel-driven elongation resembling natural actin self-assembly. Interestingly, when researchers used ATP-hydrolysing enzymes, it prompts actin dissociation. The results of this study have been published in the journal Nature Communications.

Sharing his views, Dr George mentioned “Since the stimulus in our case is ATP, which is one of the most universally present chemicals, this makes our work a benchmark in what can be achieved synthetically. Also, our study has come closest in synthetically mimicking natural protein Actin’s assembly, a protein which plays an important role in various biological functions. These outcomes will guide investigators to search for more synthetic analogues of important biological self-assembly”.

“Using biological cues like ATP opens up routes for bio-adaptable systems. A step even further perhaps is the possibility of an organic electronic device in interface with biological live feed. Such a system would be highly efficient and uniquely adaptive in reporting live biological changes in a body,” he added.

Commenting on the research findings, Prof. E. W. Meijer from Eindhoven University of Technology, The Netherlands- who is not involved in the work, said, “researchers have tackled one of the main challenges in mimicking natural systems. Where chemists normally can control the assembly of small molecules in large one-dimensional aggregates only by solvent or temperature, Nature assembles and disassembles these structures by chemical fuels – chemical reactions that take care of the growth. This study is an important next step in the development of functional life-like materials and systems.”

The research team also included Ananya Mishra, D. B. Korlepara, Mohit Kumar, Ankit Jain, N.Jonnalagadda, and K.K. Bejagam. The study was funded by the Department of Science and Technology.

(India Science Wire)

दैनिक जागरण

10-05-2018

अध्ययन

वैज्ञानिकों ने विष्णुप्रयाग के हाथी पहाड़ का सर्वेक्षण और भू-वैज्ञानिक एवं भू-तकनीकी आँकड़ों के आधार पर चट्टानों की स्थिरता का विश्लेषण किया

निगरानी से कम हो सकता है भूस्खलन का खतरा

नई दिल्ली, आइएसडब्ल्यू : हिमालय की जटिल भौगोलिक बनावट के कारण इस क्षेत्र में भूस्खलन की घटनाएँ होती रहती हैं। पिछले साल उत्तराखंड स्थित विष्णुप्रयाग के हाथी पहाड़ में हुए भूस्खलन का अध्ययन करने के बाद वैज्ञानिकों का अनुमान है कि भारी बरसात, भूकंप या फिर मानवीय गतिविधियों के कारण भविष्य में भी इस क्षेत्र में भूस्खलन की घटनाएँ हो सकती हैं।

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद से संबद्ध केंद्रीय भवन अनुसंधान संस्थान, रुड़की के वैज्ञानिक घटनास्थल के सर्वेक्षण और भू-वैज्ञानिक एवं भू-तकनीकी आँकड़ों के आधार पर चट्टानों की स्थिरता का विश्लेषण करने के बाद इस नतीजे पर पहुंचे हैं। अध्ययन के दौरान भूस्खलन से जुड़ी भू-वैज्ञानिक विशिष्टताओं, जैसे-ढलान, विखंडित चट्टानों, मलबे और दरारों को केंद्र में रखकर घटनास्थल का सर्वेक्षण और पत्थर के नमूनों की मजबूती का परीक्षण किया गया है।

अध्ययनकर्ताओं में शामिल वैज्ञानिक डॉ. शांतनु सरकार ने बताया कि ऋषिकेश से बदरीनाथ को जोड़ने वाले राष्ट्रीय राजमार्ग-58 पर स्थित यह इलाका सामरिक रूप से महत्वपूर्ण होने के साथ-साथ भूस्खलन के प्रति काफी संवेदनशील है। बरसात के



मौसम में इस इलाके में भूस्खलन की घटनाएँ होने की आशंका अधिक रहती है। टूट-फूट होते रहने के कारण राजमार्ग के बाधित होने और जानमाल के नुकसान का खतरा हमेशा बना रहता है। नियमित निगरानी, सही प्रबंधन और मानवीय गतिविधियों पर लगाम लगाकर इस खतरे को कम किया जा सकता है। वैज्ञानिकों के अनुसार चमोली से बदरीनाथ की ओर जाने राजमार्ग के आसपास स्थित यह क्षेत्र अपने कमजोर भौगोलिक गठन, खड़ी ढलान, विखंडित स्थलाकृति, भूकंपीय सक्रियता और अधिक वर्षा के कारण भूस्खलन के प्रति अत्यधिक संवेदनशील है। पिछले वर्ष 19 मई को जोशीमठ से करीब आठ किलोमीटर दूर विष्णुप्रयाग में राष्ट्रीय राजमार्ग-58 पर हुए भूस्खलन के कारण करीब 150 मीटर सड़क पूरी तरह क्षतिग्रस्त हो गई थी

और 15 हजार से अधिक यात्री 24 घंटे से अधिक समय तक वहाँ फंसे हुए थे। भू-वैज्ञानिक एवं वर्षा संबंधी आँकड़ों का विश्लेषण करने पर पहाड़ के ऊपरी भाग में कुछ नमी युक्त हिस्से वैज्ञानिकों को मिले हैं, जिसके आधार पर अनुमान लगाया जा रहा है कि पिछले साल हुए भूस्खलन की मुख्य वजह दरारों के खुलने और उनमें पानी का रिसाव हो सकता है। चट्टानों के गिरने के कारण विस्तृत क्षेत्र भले ही प्रभावित नहीं होता, पर इसके कारण जानमाल के नुकसान और वाहनों की आवाजाही बाधित होने का खतरा बना रहता है। सीधी ढाल वाले क्षेत्रों में चट्टानों के खिसकने का पता नहीं चल पाने से कई बार चेतावनी जारी करने का समय तक नहीं मिल पाता। ऐसे में निगरानी और सही रखरखाव ही खतरे को कम करने का जरिया हो सकता है। डॉ. सरकार के अनुसार, भूस्खलन के प्रति संवेदनशील इलाकों में ढलानों पर बिखरे शिलाखंडों को हटाना, रॉक बोल्टिंग के जरिये चट्टानों को स्थिर करने, वायर नेटिंग और चट्टानों को रोकने लिए अवरोधकों का निर्माण कारगर हो सकता है। हालाँकि, भूस्खलन के प्रति संवेदनशील क्षेत्र में सुरक्षा उपायों को अमल में लाने से पहले विस्तृत पड़ताल और उसी के अनुसार उपयुक्त इंजीनियरिंग डिजाइन का चयन करना चाहिए।

Nano-fertilizers in right doses can enhance the nutritional quality of wheat by increasing zinc content

News-Analysis **Vaishali Lavekar** May 10, 2018 18:21 PM IST

Micronutrient deficiency is a major challenge in India. Agronomic fortification of food grains could be used to compensate micronutrient levels in grains but it leads to nutrient wastage as well as environmental pollution resulting from excessive use of minerals and fertilizers. Now scientists at the [Agharkar Research Institute](#) here have shown that using nano-fertilisers in right doses can enhance the nutritional quality of wheat by increasing its zinc content.

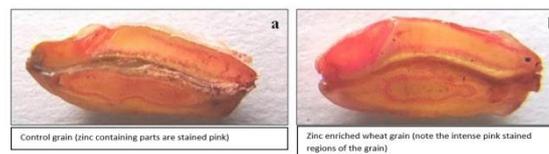


Wheat is one of the most widely consumed staple foods. But people consuming wheat without the inclusion of pulses, green leafy vegetables, nuts, meat, eggs and animal-derived food are prone to zinc deficiency. This is because wheat has low zinc content and the presence of phytates in wheat make zinc less bioavailable.

Majority of Indian soils are zinc deficient and soil zinc application is highly recommended along with the application of NPK fertilizer. Provision of macronutrient fertilizer increases the yield, but results in the dilution of the micronutrient. Conventional biofortification of wheat with zinc-containing fertilizers in high doses needs good drainage, favorable pH (slightly acidic to neutral), and adequate organic content.

To address these problems, researchers have developed zinc-nanofertilizer (Zn-CNP - Zinc Chitosan Nanoparticles) spray. The nano formulation contains zinc complexed with a biopolymer - chitosan and is applied to leaves at the grain filling stages.

In the study, two durum wheat cultivars - MACS 3125 (high yielding) and UC1114 (with high grain protein) - were used to test the efficacy of the formulation. The four- year field trial data showed that this wheat variety exhibited approximately 36% zinc enrichment upon application of the nanofertilizer. MACS 3125 wheat variety is suitable for cultivation in central and peninsular India.



"The use of Zn - CNP reduced the fertilizer requirement up to eightfold than the conventional zinc sulphate containing fertilizer. The increased zinc content in the grain improved its protein content and other micronutrients like iron and manganese," Dr Jyutika Rajwade, the team leader, explained while speaking to India Science Wire.

Despite increased grain zinc content the yield of wheat remained unaffected for MACS 3125 variety. This means leaf-applied zinc indeed reaches the grain. UC1114 (with high grain protein) variety showed significantly high zinc, protein and iron content but exhibited a late flowering as compared with MACS 3125.

Dr. Rajwade said, "our work defines a new paradigm in micronutrient application - use nano-fertilizers at the right place, right time and in right doses. Grain zinc enrichment not only improves nutritional quality benefitting the consumers but also the farmer, who gets an improved crop-stand in the next cropping cycle. Deployment of such systems for delivery of other nutrients and across other crops is indeed possible."

The research team included Ashwin Dapkekar, Paresh Deshpande, Dr. Manoj D. Oak, Dr. Kishore M. Paknikar, and Dr. Jyutika M. Rajwade. This work has been published in the journal Scientific Reports. The research was funded by [**Indian Council of Agriculture**](#)

Research (ICAR) under its National Fund for Basic, Strategic and Frontier Application in Agricultural Research (NFBSFARA).



EASTERN MIRROR

More News, More Truth

Innovative technologies for clean environment

May 10, 2018



New Delhi, May 10 (India Science Wire): Mobile garbage collecting and dumping device, machine for water hyacinth removal, and biodegradable plastic products for packaging, bags and disposables. These are but few of the technologies displayed at an exhibition being held at the Department of Science and Technology here.

The exhibition was inaugurated by Prof Ashutosh Sharma, Secretary DST on May 7 as part of a fortnight long Swachhata Pakhwada programme to showcase the technologies that have been developed in the country to address the problem areas in sanitation and cleanliness.

Prof Sharma said the technologies that have been developed over the years with funding and other support from DST would also come up for discussions being held with scientists and experts as part of the Pakhwada with a view to promote their widespread use.

Vigyan Prasar, Department of Biotechnology (DBT), Biotechnology Industry Research Assistance Council (BIRAC), Technology Information, Forecasting and

Assessment Council (TIFAC), Technology Missions Division (TMD), Science for Equity, Empowerment & Development (SEED), Indo- U.S Science and Technology Forum (IUSSTF), National Entrepreneurship Board (NEB) and National Innovation Foundation – India (NIF) are participating in the exhibition, besides several NGOs working in the area of sanitation.

“The machine can efficiently undertake all operations like soil lump breaking, raw material mixing and brick making. It can make 140-150 blocks (of size 15 x 9 x 7 inches) per hour.”

Godasu Narsimha Pallesrujana is an innovator, who has developed a water hyacinth removal machine. The machine, consisting of a five hp electric motor, has been found to have been very useful to fishermen as it has significantly reduced the labour and cost that was consumed during the traditional method of manual removal of hyacinth from water bodies using cutters.

Another interesting exhibit on display is a machine to make bricks out of fly ash. It has been developed by Arjunbhai M. Paghdar from Junagadh, Gujarat. The machine can efficiently undertake all operations like soil lump breaking, raw material mixing and brick making. It can make 140-150 blocks (of size 15 x 9 x 7 inches) per hour. It can be used for making both conventional and interlocking bricks of different sizes by changing the mould. It eliminates the need to employ woman and child labour in the brick making process.

Prem Ranjan Singh, Shivani Singh and Ankush Pal from Daman and Diu have developed an innovative dustbin. Unable to bear the sight of overflowing garbage bins, the three friends have come up with a dustbin with separate slots for biodegradable and non-biodegradable waste plus a message sending facility. A message would be despatched to the municipality automatically once the dustbin is filled up to a preset level.

The Department of Science & Technology is observing the Swachhata Pakhwada from May 1 to 15. Other activities planned during the programme include expert talks and stakeholders consultations on clean water, clean air, clean energy and waste management. Child innovators will also showcase their innovations and prototype models for Swachhata on May 14 at Technology Bhawan.

स्वच्छ पर्यावरण के लिये विज्ञान और प्रौद्योगिकी आधारित नवाचार

Author: उमाशंकर मिश्र Source: इंडिया साइंस वायर, 10 मई, 2018



विज्ञान एवं प्रौद्योगिकी विभाग द्वारा आयोजित प्रदर्शनी में भाग लेते बच्चे नई दिल्ली। कचरा प्रबन्धन, दूषित जल शोधन, प्रदूषण नियंत्रण, हरित और सौर ऊर्जा के उपयोग समेत विज्ञान तथा प्रौद्योगिकी आधारित कुछ ऐसे प्रयोग हैं, जो स्वच्छ और सुरक्षित पर्यावरण सुनिश्चित करने में मददगार हो सकते हैं। विज्ञान एवं प्रौद्योगिकी विभाग द्वारा आयोजित एक प्रदर्शनी में इसी तरह के प्रयोगों पर आधारित तकनीकी एवं वैज्ञानिक नवाचारों को दर्शाया गया है।

इस प्रदर्शनी का उद्घाटन 7 मई को विज्ञान और प्रौद्योगिकी विभाग (डीएसटी) के सचिव प्रोफेसर आशुतोष शर्मा ने किया। नई दिल्ली के टेक्नोलॉजी भवन में लगी इस प्रदर्शनी का बृहस्पतिवार को अन्तिम दिन था। इस प्रदर्शनी को देखने के लिये हर रोज बड़ी संख्या में लोग पहुँच रहे थे, जिनमें स्कूली बच्चों की संख्या सबसे अधिक थी। स्वच्छ भारत मिशन के अन्तर्गत चल रहे स्वच्छता पखवाड़े के दौरान पर्यावरण की स्वच्छता में योगदान देने वाली प्रौद्योगिकियों को प्रदर्शनी में पोस्टर और मॉडल्स के जरिये प्रदर्शित किया गया।

एक टन कचरे से 70 किलोग्राम एलपीजी के बराबर बायोगैस उत्पन्न करने वाला संयंत्र 'बायोऊर्जा', जलस्रोतों से कार्ब और जलकुम्भी के निस्तारण के लिये बनायी गई मशीन, कचरे को इकट्ठा करने और फेंकने के लिये मोबाइल डिवाइस, डबल डोर डस्टबिन, राख से ईट बनाने की मशीन, बायो-टॉयलेट, जल-शोधन के लिये अवायवीय दानेदार गाद जैसे पदार्थ का उपयोग, ठोस कचरे के प्रबन्धन के लिये 'राइनोडाइजेस्टर' और स्वच्छता से जुड़े यंत्रों के संचालन के लिये सौर ऊर्जा के प्रयोग से जुड़े दर्जनों मॉडल और पोस्टर प्रदर्शनी में दर्शाये गये थे।

प्रोफेसर शर्मा के अनुसार, "विज्ञान एवं प्रौद्योगिकी विभाग की ओर से पर्यावरण को सुरक्षित एवं स्वच्छ बनाये रखने वाली शोध परियोजनाओं को अनुदान मुहैया कराया जा रहा है। प्रदर्शनी में डीएसटी के सहयोग से विकसित ऐसी प्रौद्योगिकियों को प्रमुख रूप से प्रदर्शित किया गया है, जो पर्यावरण को स्वच्छ बनाये रखने में मददगार हो सकती हैं।"

इस आयोजन की नोडल एजेंसी राष्ट्रीय नवप्रवर्तन संस्थान से जुड़े तुषार गर्ग ने इंडिया साइंस वायर को बताया कि “प्रदर्शनी में जैव प्रौद्योगिकी विभाग, बायो टेक्नोलॉजी इण्डस्ट्री रिसर्च असिस्टेंट काउंसिल (बाइरेक), टेक्नोलॉजी इंफॉर्मेशन, फोरकास्टिंग असेसमेंट काउंसिल (टाइफेक), टेक्नोलॉजी मिशंस डिविजन, साइंस फॉर इक्विटी, एम्प्लॉयमेंट (सीड), विज्ञान प्रसार, इंडो-यूएस साइंस एंड टेक्नोलॉजी फोरम और नेशनल एंटरप्रेन्योरशिप बोर्ड के अलावा कई गैर सरकारी संस्थाएँ भी शामिल थीं।”

इस महीने की 15 तारीख तक चलने वाले स्वच्छता पखवाड़े के दौरान नवाचारी स्कूली बच्चों के बनाये स्वच्छता को सुनिश्चित करने वाले मॉडल्स और प्रोटोटाइप 14 मई को टेक्नोलॉजी भवन में प्रदर्शित किये जाएँगे। स्वच्छता पखवाड़े के दौरान स्वच्छ पर्यावरण से जुड़े विभिन्न विषयों पर विशेषज्ञों की परिचर्चा भी आयोजित की गई थी। इस परिचर्चा में डीएसटी के पूर्व सचिवों समेत कई प्रमुख वैज्ञानिक और शोधार्थी शामिल थे।



Research Stach

National Technology Awards Presented

President Ram Nath Kovind on Friday presented the national award for successful commercialization of indigenous technology to Hyderabad-based [Bharat Biotech International Limited](#) and Ernakulam-based [Agappe Diagnostic Limited](#).

Bharat Biotech has won the award for taking to the market a vaccine for rotavirus disease. The vaccine, Rotavac, is currently licensed in two countries, while the grant of license is under process in 30 other countries. It has also been prequalified by [World Health Organisation](#), making it eligible for procurement by [UN](#) and other humanitarian organizations for their public health vaccine programmes.

Agappe Diagnostics has won the award for commercializing an automated cartridge-based specific protein analyzer. The instrument has become highly popular as it is smaller and cheaper compared to similar machines available from multinational companies.

The President presented the awards to mark the 20th National Technology Day.

He also gave away national awards to five medium and small-scale enterprises for commercializing indigenously technologies. The winners are [Synkromax Biotech](#), [ANTS Ceramics](#), [3B Blackbio Biotech](#), [Envision Scientific](#) and [Hind High Vacuum](#).

Synkromax got the award for marketing a life-saving implant developed by IIT, Madras, while ANTS Ceramics got the award for commercializing high-end zirconia ceramic products and carbon-sulfur analysis crucibles and 3B Blackbio Biotech for working on a kit for diagnosis and prognosis of Chronic Myeloid Leukemia.

Envision Scientific got the award for commercializing an indigenously developed drug-eluting stent for diabetic patients and Hind High Vacuum got for commercializing thin film metalized alumina circuit for space applications.

Three start-ups got award for developing technologies that have commercial potentials – Astrome Technologies at the [Indian Institute of Science](#), Bengaluru, for its work on GigaMesh, which is said to be the first point to multipoint millimeter wave wireless

communication solution in the world; CyCa Onco Solutions at Kalinga Institute of Industrial Technology, Bhubaneswar, for developing two drug delivery devices for delivery of anti-cancer drug, Crisplatin; and Xcellence in Bio Innovation and Technologies at BITS Pilani Hyderabad campus, for developing a point of care device for testing antibiotic sensitive of pathogens causing urinary tract infections.

Speaking on the occasion, the [President](#) noted that the Technology Day was a landmark day for the country as it was on this day two decades ago that the Pokhran nuclear tests took place and demonstrated India's capacity as a nuclear weapons state as well as a mature and responsible technology power, capable of harnessing sensitive knowledge.

He said technology was a destiny for the country as all national programmes required a force multiplier in the form of technology. But, at the same time, it must also be about equity. "Its (technology's) fruits must be accessible to all. Finance and resources should be available to all technologists who may wish to turn entrepreneurs – and to migrate from the lab room to the shop floor." Above all, the President said, gender equity must be integrated with technology production and technology sharing.

(India Science Wire)

Young Indian innovators all set to compete with best brains from 78 countries

SUNDERARAJAN PADMANABHAN

NEW DELHI, MAY 11

Obesity is on the rise globally, emerging as a major public health challenge. While sedentary lifestyle and unhealthy diets are major causes, there are several other contributory factors which are largely ignored.

Obesogens are a class of what are called endocrine disruptors. These chemicals inappropriately alter lipid homeostasis, change metabolic set points as well as regulation of appetite and satiety to promote fat accumulation. They are found abundantly in the environment including plastic bottles, metal food cans and detergents and are, therefore, difficult to avoid.

Tanya Goyal and S.M.C. Ganesh from Maharaja Agrasen Public School in Delhi have found that fresh water algae named Chlorella Pituuta could be a solution. “We have conducted four experiments including triglyceride assay to check fat storage and expression of genes associated with adipogenesis and fat accumulation. The results showed that the algae helped in regulation of genes against activation induced by obesogens,” the children said while speaking to India Science Wire.

The two are now all set to go to America to make a presentation at a global meet for young innovators being organised by Intel at Pittsburg from May 13 to 18. As many as 1,800 young innovators from 78 countries would be competing for about USD 34 million in awards.

Antara Raaghavi Bhattacharya of C.D.Somani Memorial School, Mumbai, has been trying to analyse data from NASA’s exoplanet archive and Exoplanet Orbit Database. “In the last few years, many exoplanetary systems have been discovered, especially by NASA’s Kepler mission. Much recent work has focused on finding other earth like planets within potentially habitable zones around stars. However, a lot of exoplanetary data has still not been fully analysed. I am looking at those data”.

In all, 25 school children are participating in the competition from India. The other projects that are to be presented include a diagnostic tool to identify spatial abilities in scholastically classified slow learners, a new approach to help curb malignancy of tumor cells, a portable real time data acquisition device for lake water quality monitoring and mapping and a project for non-invasive detection of asymptomatic heart attacks using bioelectrics. Another selected

projects is designed for better understanding of formation and evolution of planetary systems by looking into understand by Antara Raaghavi B.

The programme is part of a partnership between Department of Science and Technology (DST), Indo-US Science and Technology Forum and Intel, known as the Initiative for Research and Innovation in Science (IRIS). It is conducted annually for school students of class 8 to 12. They compete in 17 subject categories.

Flagging off the 25 strong young innovators team at a function here on Thursday, DST Secretary Ashutosh Sharma expressed confidence that students would bring lot of laurels to the country. So far, 115 Indian students have won 132 awards, competing against more than six million children of their age group from different parts of the world.

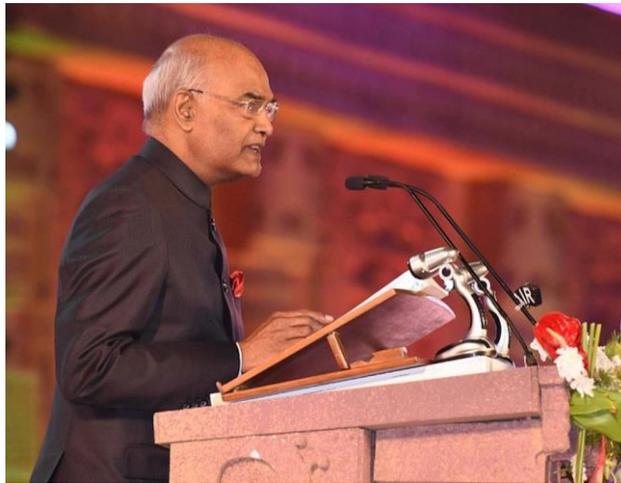
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उन्नत प्रौद्योगिकी के विकास लिए उद्यमियों को राष्ट्रीय पुरस्कार

[Umashankar Mishra](#) Tuesday 15 May 2018

स्वच्छ ऊर्जा विकल्पों और जल उपलब्धता की चुनौती को पूरा करने के लिए सफल प्रौद्योगिकी समाधान आधारित प्रदर्शन और स्थापना कार्य हो रहे हैं।



बदलते वक्त के साथ भारत को विज्ञान के क्षेत्र में नए आयाम तय करने की जरूरत है। सरकार ने रोबोटिक्स, कृत्रिम बुद्धि, डिजिटल निर्माण, बिग डेटा एनालिटिक्स, क्वांटम संचार और वस्तु अंतरजाल (इंटरनेट ऑफ थिंग्स) के उभरते क्षेत्रों में युवा तकनीशियनों को प्रशिक्षित करने के लिए उत्कृष्टता केंद्र स्थापित करने का प्रस्ताव दिया है। इसके साथ ही स्वच्छ ऊर्जा विकल्पों और जल उपलब्धता की चुनौती को पूरा करने के लिए सफल प्रौद्योगिकी समाधान आधारित प्रदर्शन और स्थापना कार्य हो रहे हैं।

ये 21वीं सदी की चुनौतियां हैं और उन्हें 21वीं शताब्दी के उत्तर की आवश्यकता है। ये बातें राष्ट्रपति राम नाथ कोविंद ने कही हैं। वह विज्ञान और प्रौद्योगिकी विभाग द्वारा 20वें प्रौद्योगिकी दिवस के अवसर पर नई दिल्ली के विज्ञान भवन में आयोजित कार्यक्रम को संबोधित कर रहे थे।

इस अवसर देसी प्रौद्योगिकीयों एवं प्रौद्योगिकी आधारित उत्पादों के सफल व्यवसायीकरण और व्यवसायीकरण के लिए उपयुक्त प्रौद्योगिकी के विकास समेत तीन श्रेणियों में राष्ट्रीय पुरस्कार भी प्रदान किए गए। प्रतिवर्ष 11 मई के दिन विभिन्न व्यक्तियों, नए आविष्कारकों को उनके स्वदेशी तकनीकी योगदान के लिए भारत के तकनीकी विकास बोर्ड द्वारा ये पुरस्कार दिए जाते हैं।

देसी प्रौद्योगिकीयों के व्यवसायीकरण के लिए केरल की अगापी डायग्नोस्टिक्स और हैदराबाद की कंपनी भारत बायोटेक लिमिटेड को इस वर्ष पुरस्कृत किया गया है। अगापी डायग्नोस्टिक्स को मिस्पा-आई3 नामक कार्ट्रिज आधारित प्रोटीन एनालाइजर के विकास और भारत बायोटेक को रोटावायरस वैक्सीन के विकास एवं मैनुफैक्चरिंग लिए यह पुरस्कार दिया गया है।

इन पुरस्कारों की दूसरी श्रेणी में प्रौद्योगिकी आधारित उत्पादों के सफल व्यवसायीकरण के लिए मध्यम एवं लघु उद्यमों को पुरस्कृत किया गया है।

टिश्यू इंजीनियरिंग के लिए सिंक्रोस्काफ नामक बोवाइन स्कैफ़ल्ड विकसित करने के लिए चेन्नई की कंपनी सिंक्रोमैक्स बायोटेक, ज़िरकोनिया सिरैमिक उत्पादों तथा कार्बन सल्फर के विश्लेषण के लिए खास पात्र बनाने के लिए महाराष्ट्र के वसई ईस्ट में स्थित एन्ट्स सिरैमिक्स, रियल टाइम आधारित क्यूपीसीआर किट विकसित करने के लिए भोपाल की ब्लैकबायो बायोटेक इंडिया लिमिटेड, मधुमेह से ग्रस्त मरीजों के लिए ड्रग एल्यूटिंग स्टेंट बनाने के लिए सूरत की इनविजन साइंटिफिक लिमिटेड और स्फटिक मिट्टी की परत पर मेटलाइजेशन के लिए बंगलूरु की हिंद हाई वैक्यूम कंपनी को भी पुरस्कार दिया गया है।

पुरस्कारों की तीसरी श्रेणी में प्रौद्योगिकी स्टार्टअप के तहत बंगलूरु स्थित एस्ट्रोम टेक्नोलॉजी को नई इंटरनेट तकनीक गीगामेश के विकास, भुवनेश्वर की ओन्कोसॉल्यूशन्स को दो ड्रग डिलीवरी डिवाइसों के विकास और जोधपुर की एक्सीलेंस इन बायो-इनोवेशन एंड टेक्नोलॉजी को मलमूत्र में पाए जाने वाले रोगाणुओं की जैव प्रतिरोधी क्षमता के परीक्षण के लिए प्वाइंट ऑफ केयर डिवाइस विकसित करने के लिए यह पुरस्कार दिया गया है।

प्रौद्योगिकी दिवस को वर्ष 1998 के पोखरण परमाणु परीक्षण की याद में हर साल मनाया जाता है। राष्ट्रपति ने इस अवसर पर परमाणु परीक्षण के लिए पूर्व प्रधानमंत्री अटल बिहारी वाजपेयी की दृढ़ इच्छाशक्ति और पूर्व राष्ट्रपति एपीजे अब्दुल कलाम के योगदान का उल्लेख करते हुए कहा कि भारत ने परमाणु संपन्न देश और शक्तिशाली प्रौद्योगिकी के परिपक्व उपयोगकर्ता के रूप में दुनिया में अपनी साख कायम की है।

पुरस्कृत किए गए लोगों को बधाई देते हुए राष्ट्रपति ने कहा कि “आजादी के बाद भारत ने परमाणु और अंतरिक्ष विज्ञान के क्षेत्र में प्रौद्योगिकी एवं ज्ञान उत्पादन में ऊंची छलांग लगाई है। हमने संचार प्रौद्योगिकी, आईटी, फार्मास्यूटिकल्स और जैव प्रौद्योगिकी में सर्वोत्तम श्रेणी की क्षमताओं में विस्तार किया है। इसने हमारे देश के बारे में धारणाओं को बदल दिया है और हमारे लोगों और हमारी अर्थव्यवस्था दोनों की मदद की है।”

(इंडिया साइंस वायर)



बढ़ती कार्बन डाइऑक्साइड से फसलों में बढ़ सकता है कीट प्रकोप

By शुभ्रता मिश्रा | Publish Date: May 14 2018 6:05PM



वास्को-द-गामा (गोवा), (इंडिया साइंस वायर): वातावरण में लगातार बढ़ रही कार्बन डाइऑक्साइड के कारण फसल उत्पादन पर सकारात्मक प्रभाव पड़ सकता है, पर इसके साथ ही फसलों के लिए हानिकारक कीटों की आबादी में भी बढ़ोत्तरी हो सकती है। धान की फसल और उसमें लगने वाले भूरा फुदका कीट पर कार्बन डाइऑक्साइड की बढ़ी हुई मात्रा के प्रभावों का अध्ययन करने के बाद कटक स्थित राष्ट्रीय चावल अनुसंधान संस्थान और नई दिल्ली स्थित भारतीय कृषि अनुसंधान संस्थान के वैज्ञानिक इस नतीजे पर पहुंचे हैं।

वैज्ञानिकों का अनुमान है कि वर्ष 2050 में कार्बन डाइऑक्साइड 550पीपीएम और वर्ष 2100 में 730-1020 पीपीएम तक पहुंच जाएगी। भविष्य में फसलों और कीटों दोनों के अनुकूलन पर इसका प्रभाव पड़ सकता है। अध्ययन के दौरान कार्बन डाइऑक्साइड की अलग-अलग दो तरह की मात्राओं क्रमशः 390 से 392 पीपीएम और 578 से 584 पीपीएम के वातावरण में चावल की पूसा बासमती-1401 किस्म को बरसात के मौसम के दौरान 2.5 मीटर ऊंचे और तीन मीटर चौड़े ऊपर से खुले हुए कक्ष में नियंत्रित परिस्थितियों में उगाया गया था। समयानुसार पौधों को भूरा फुदका (ब्राउन प्लांट हापर) कीट, जिसका वैज्ञानिक नाम नीलापर्वता लुजेन्स है, से संक्रमित कराया गया।

शोधकर्ताओं ने फसल उत्पादन के साथ-साथ कीट के निम्फों (शिशुओं), नर कीटों और पंखयुक्त व पंखहीन दोनों प्रकार के मादा कीटों की संख्या सहित उनके जीवनचक्र पर कार्बन डाइऑक्साइड के बढ़े स्तर के प्रभावों का अध्ययन किया है।

अध्ययनकर्ताओं में शामिल वैज्ञानिक डॉ. गुरु प्रसन्ना इंडिया साइंस वायर को बताया कि "सामान्यतः अधिक कार्बन डाइऑक्साइड वाले वातावरण में उगने वाले पौधों की पत्तियों में कार्बन व नाइट्रोजन का अनुपात बढ़ जाता है, जिससे पौधों में प्रोटीन की सांद्रता कम हो जाती है। धान के पौधों में प्रोटीन की कमी की पूर्ति के लिए

कीट अत्यधिक मात्रा में पोषक तत्वों को चूसना शुरू कर देते हैं। कीटों की बढ़ी आबादी और चूसने की दर में वृद्धि के कारण धान की फसल की गुणवत्ता प्रभावित होती है और पैदावार कम हो जाती है। अनुमान लगाया गया है कि धान की फसल के उत्पादन में इस तरह करीब 29.9–34.9 प्रतिशत तक नुकसान हो सकता है।”

अध्ययन के दौरान कार्बन डाइऑक्साइड के बढ़े हुए स्तर से धान की उपज पर सकारात्मक प्रभाव देखने को मिला और उत्पादन में 15 प्रतिशत बढ़ोत्तरी जरूर दर्ज की गई, पर इसके साथ ही फसल में लगने वाले भूरा फुदका कीट की आबादी भी दो से तीन गुना बढ़ गई।

शोधकर्ताओं ने पाया कि धान के पौधों में बालियों की संख्या में 17.6 प्रतिशत, पकी बालियों की संख्या में 16.2 प्रतिशत, बीजों की संख्या में 15.1 प्रतिशत और दानों के भार में 10.8 प्रतिशत की वृद्धि दर्ज की गई। इससे कीटों की प्रजनन क्षमता में हुई 29 से 31.6 बढ़ोत्तरी के कारण इनकी संख्या में भी 97 से 150 कीट प्रति पौधे की वृद्धि दर्ज की गई। हालांकि, बढ़ी हुई कार्बन डाइऑक्साइड के कारण नर व मादा दोनों कीटों की जीवन क्षमता में कमी पायी गई। एक तरफ भारी संख्या में कीट तो उत्पन्न जाते हैं, लेकिन वे अपेक्षाकृत कम समय तक जीवित रह पाते हैं।

वैज्ञानिकों के अनुसार, चावल भारत सहित एशिया एवं विश्व के बहुत से देशों का मुख्य भोजन है। विश्व में मक्का के बाद धान ही सबसे अधिक उत्पन्न होने वाला अनाज है। ऐसे में भविष्य में बढ़ी हुई कार्बन डाइऑक्साइड का प्राकृतिक तौर पर लाभ उठाने के लिए भूरा फुदका जैसे कीटों के नियंत्रण हेतु उचित प्रबंधन की आवश्यकता पड़ेगी। इस दिशा में अभी अध्ययनों की बहुत कमी है।

भविष्य में भूरा फुदका के कारण धान की फसल के लिए खतरे में पड़ सकती है। कम जीवन काल, उच्च प्रजनन क्षमता और शारीरिक संवेदनशीलता के कारण ये कीट परिवर्तित होती जलवायु के अनुसार आसानी से स्वयं को रूपांतरित कर सकते हैं। इसलिए निकट भविष्य में कीटों की रोकथाम, उचित प्रबंधन के लिए बेहद सतर्कता बरतनी होगी।

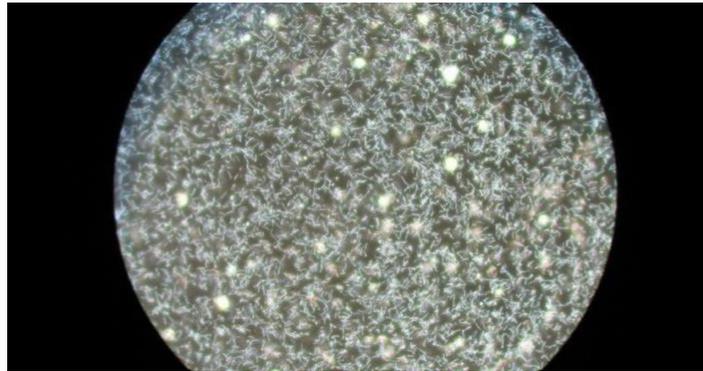
अध्ययनकर्ताओं की टीम में डॉ. गुरु प्रसन्ना पांडी के अलावा सुभाष चंदर, मदन पाल और पी.एस. सौम्या शामिल थे। यह अध्ययन शोध पत्रिका करंट साइंस में प्रकाशित किया गया है।

(इंडिया साइंस वायर)

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Lab notes: The key to a leptospirosis vaccine may be protein in the pathogen

Researchers have identified small parts of proteins as potential vaccine candidates that can elicit a strong immune response.



Leptospira enlarged 200 times under a microscope | Wikimedia Commons

May 18, 2018 · 05:30 am

[Shikha T Malik](#)

Leptospirosis, caused by the pathogenic bacterium *Leptospira*, led to over one million infections globally in 2015. Availability of an appropriate vaccine could have prevented most of them. Scientists at the Gujarat Biotechnology Research Centre have used sophisticated tools to identify important regions on the bacteria that could play an important role in developing a vaccine for leptospirosis.

Leptospirosis is a zoonotic disease, meaning it spreads through animals. Farmers or veterinarians frequently exposed to animal urine or swimmers exposed to contaminated water are at high risk. People may get exposed to the bacteria during flooding as well. Vaccinating such high risk groups can protect them from Leptospirosis.

The team at GBRC used high throughput computational tools to identify regions on pathogenic *Leptospira*, which could be critical in designing an effective vaccine. Using, bioinformatics tools, researchers studied the whole set of proteins of bacteria cell (proteome) and its genome.

As a protection mechanism from a pathogen, human body fights back by making antibodies or activating cells that kill other infected cells which scientists refer to as “immune response”. Vaccines prepare our bodies by eliciting such response even before one is infected by a pathogen. This way vaccines equip us to fight a pathogen or disease as soon as we are exposed to it.

Researchers have identified certain peptides (small parts of proteins) which could be further tested as potential vaccine candidates that can elicit a strong immune response. These peptides are part of an “outer membrane protein” of the bacterium. This protein is conserved in 46 types of disease causing *Leptospira*, and if confirmed and further developed into a vaccine, it could provide immunity against all 46 types.

“Identification of target sites is a key step in vaccine design,” explained lead scientist Dr Jayashankar Das. “With the help of modern genomics, proteomics and bioinformatics tools we have analyzed the pathogenic proteome (3654 proteins) to predict the antigenicity (ability to elicit an immune response) and narrowed down to a single protein of high affinity with ability to bind to the antibody present on B-cells for inducing immune response.”

Since many different strains or types of *Leptospira* are present in tropical regions, the team is carrying out more studies on different strains and also testing identified proteins in cells, added Dr Das. “Since this disease is a major concern to farmers as well as livestock breeders, we are also involved in developing an onsite diagnostic kit for leptospirosis with support from the Department of Science and Technology,” he added.

“These peptides represent a novel outcome of the study. They need to be studied further in for their effectiveness in animals and humans. If successful, it could become an important tool in fighting this disease worldwide,” commented Dr Hardeep Vora, R&D Manager at DiaSys Diagnostics India.

The research results have been published in journal *Scientific Reports*. The team included Kumari Snehkant Lata, Swapnil Kumar, Vibhisha Vaghasia, Priyanka Sharma, Shivarudrappa B. Bhairappanvar, Subhash Soni and Jayashankar Das. The research work was supported by the Gujarat State Biotechnology Mission.

This article is from India Science Wire.



Children display innovative and eco-friendly ideas



~By **Jyoti Singh** May 15, 2018

An app-driven automated food maker, an automatic dust lifting machine, a dustbin with sound alert, hand-driven waste picking and dumping cart, currency note sterilizing machine for ATMs, wrapper picker, cycle-powered road cleaner, a tiffin box that reminds children to wash hands before eating.

These are some of the ideas and models on display at the Child Innovators Exhibition which opened on Monday, May 14 as the part of the sanitation fortnight organized by the Department of Science and Technology (DST) in New Delhi.



Abhishek Bhagat explaining about his innovation

Abhishek Bhagat from Bhagalpur in Bihar has developed an automated electric-operated food making machine. One can choose a dish from a recipe list, along with the quantity to be cooked. The machine has different boxes for ingredients from where it automatically takes required ingredients and prepares the selected dish. It has the function of verbal instructions as well. Abhishek has also developed a mobile app that can control functions of the cooker.

“In my family only my mother used to cook and if she used to fall ill or had to go out then I had to cook. From there I got an idea, and I started working on this machine that cooks itself,” Abhishek said.



Automated cooking machine on display

Another innovator Aarthv Sharma from Kullu, Himachal has conceived the idea of an innovative hygienic toilet seat cover lifting mechanism using foot. The basic problem with the western toilet is that the rim gets wet and dirty after use. It is unhygienic to use such toilets. So, he has placed a pedal adjacent to the toilet pot that pulls up the rim so that it gets

dry. With the help of this mechanism, one can easily lift the seat cover without using hands. “I am further working on this prototype to put a slanting water flush system on the fixed rim so that it flushes the urine also,” he said.

Yet another innovation is remote controlled dustbin with wheels. Aditya Kumar said that his grandmother was sick and bed-ridden so he thought of developing a remote controlled dustbin. According to him, it works like a remote controlled car. The dustbin is fitted with wheels and can be navigated using a remote. He has made a mobile app for this.

Anju Bhalla, Joint Secretary, DST, said “these ideas coming from children are connected with real life and felt needs. While academic research mostly remains restricted to labs but these ideas have the capacity to make an impact on the society. These children have amazing potential and they have new ideas to solve day today problems.” The exhibition has been put together by the Ahmedabad-based National Innovation Foundation (NIF) which works with children and grassroots innovators.

(India Science Wire)



Remembering the Kerala Physicist Who Was Nominated for the Nobel Prize 9 Times!

Nominated for the Nobel Prize nine times, ECG Sudershan made path-breaking discoveries in the field of quantum optics in an illustrious career spanning five decades.

May 14, 2018, 7:17 pm

The world of science has lost an eminent physicist with the passing away of Prof. ECG Sudershan, who was nominated for Nobel Prize several times but missed the coveted honour every time. His research interests spanned a wide range of fields from particle physics, quantum optics, and quantum field theory to quantum information theory, gauge theories and classical mechanics.

Born on September 16, 1931, at Pallam in Kottayam district of Kerala, he did his M.Sc. from Madras University and Ph.D from University of Rochester, New York. He had his academic career mostly in the US. He passed away at Texas. He was a Professor at University of Texas for the past 40 years. In 1980s, he worked as Director of Institute of Mathematical Sciences at Chennai for five years.

One of the most accomplished and renowned theoretical physicists of Indian origin, he is known for his prodigious creative output.



ECG Sudershan

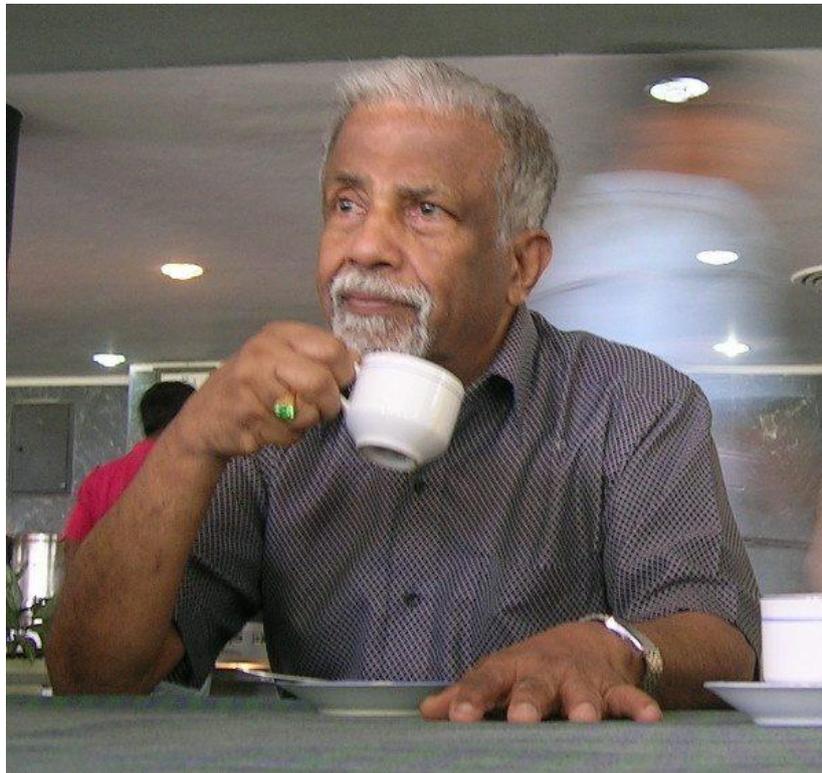
He together with American physicist, Robert Eugene Marshak came out in 1957 with what is called the V.A.Theory of Weak Interactions. Three others, Sheldon Glashow, Abdus Salam and Steven Weinberg, developed it further. It eventually evolved as electro weak theory of weak interactions.

The three got the Nobel Prize for their work in 1979. Dr. Sudarshan and Prof. Marshak got left behind.

Dr. Sudarshan achieved another breakthrough in 1960s, when he propounded the theory of Tachyons. According to the theory, there should be particles called Tachyons, which had speeds larger than that of light. So far, the particles have not been found experimentally.

But, physicists are hopeful. As and when they are discovered, it will be a historical moment as it would markedly change the conception and understanding of the universe. Tachyon is considered as a revolutionary idea within the framework of the Special Theory of Relativity.

Even as he missed the Nobel prize several times, Dr. Sudarshan openly expressed his anguish when the Royal Swedish Academy of Sciences chose to give a prize to Dr. RJ Glauber in 2005 “for his contribution to the quantum theory of optical coherence”, ignoring Dr. Sudarshan’s work.



In a letter to the Academy, he said,

“In the announcement of the 2005 Physics Nobel Prize, the Swedish Royal Academy has chosen R.J. Glauber to be awarded half of the prize. The prize winners are chosen by the Royal Academy, but no one has the right to take my discoveries and formulations and ascribe them to someone else!

“The correct formulation of the quantum mechanical treatment of optics was carried out by me in my paper in 1963. In that I showed that every state can be represented in the diagonal form... This diagonal representation is valid for all fields.

“... The irony of the situation is that in spite of all these facts being available in print, the diagonal representation instead of being referred to as the Sudarshan representation is dubbed as either the P-Representation (as if Glauber discovered and named it first) or at best as ‘Glauber-Sudarshan’ Representation.

“While the distinction of introducing coherent states as basic entities to describe optical fields certainly goes to Glauber, the possibility of using them to describe ‘all’ optical fields (of all intensities) through the diagonal representation is certainly due to Sudarshan.

Thus there is no need to ‘extract’ the classical limit [as stated in the Nobel citation]. Sudarshan’s work is not merely a mathematical formalism. It is the basic theory underlying all optical fields. All the quantum features are brought out in his diagonal representation...

“It is my belief that the Royal Swedish Academy was impartial and that to assure the proper priorities it has a Committee in Physics, with members competent to examine and understand the published work. It was also my belief that the members of the Committee did their work diligently and with care.

I am therefore genuinely surprised and disappointed by this year’s choice. It would distress me and many others if extra scientific considerations were responsible for this decision. It is my hope that these glaring injustices would be noted by the Academy and modify the citations.

Give unto Glauber only what is his”.

Article Courtesy: India Science Wire

No Mincing Words: India Is Warming Rapidly

The area of land over which a temperature of 40+° C can be measured has been expanding since the 1970s.



Credit: Jorge Vasconez/Unsplash

[Dinesh C Sharma](#)

16/MAY/2018

New Delhi: A new study on climate change in India has confirmed a rapid rise in surface temperatures in the past 70 years.

The study calculated temperature rise in terms of change occurring from decade to decade, using information from two different datasets covering the period from 1951 to 2013. The temperature data was retrieved from 395 meteorological stations across the country. The scientists analysed the maximum, minimum and daily mean temperatures data for summer, monsoon and winter periods.

The study has found that there is a notable warming trend in northwestern India, beginning in the 1970s and accelerating through the 2000s and the 2010s.

The decadal mean of daily maximum temperature for April and May in the 2010s was 40-42° C over large parts of India. However, in the 1950s, the area with this high temperature was limited to a relatively smaller spot in south-central India, where it measured 41° C. The area of land over which a temperature of over 40° C could be measured began to expand in the 1970s.

After a short-lived letup in the 1990s, the size of the region hotter than 40° expanded through the 2000s and the 2010s. The size of the region hotter than 41° has expanded

similarly, and that of the region hotter than 42° grew to include south-central India in the 2010s, the researchers reported.

On the flip-side, the country's northeastern parts have been experiencing slower warming, or even cooling, trends.

“India, taken as a whole, is experiencing warming as an integral part of the warming that is happening globally due to global climate change,” said Robert S. Ross of Florida State University. He conducted the study along with researchers from IIT Bhubaneswar and the India Meteorological Department (IMD), New Delhi.

He explained to *India Science Wire* that the reason for “surface cooling or reduced warming seen across central India” was the “regional effect of a plume of aerosol pollution that affects parts of southeast Asia and extends into central India.” He also said that the plumes are best observed outside of the monsoon months, when their presence is not masked by precipitation.

“The temperature pattern seen in India is likely happening in many parts of the world where the brown haze pollution is being produced,” he added. “Increased atmospheric carbon dioxide is driving global warming, and brown haze pollution is modulating this regionally.”

The brownish haze found over most of the North Indian Ocean and South Asia is composed of aerosols that absorb solar radiation, leading to a cooling effect. “If the pollution plume changes its geographical location, we would expect the cooling pattern to also shift,” Ross said.

However, other experts do not agree with the hypothesis linking cooling and the brown haze proposed in this study, while simultaneously agreeing with the temperature patterns. “We have shown that intensive irrigation is a major driver of land surface cooling in the Indo-Gangetic Plain rather than atmospheric aerosols,” Vimal Mishra, of the Water and Climate Lab at IIT Gandhinagar, told *India Science Wire*.

According to him, an older study he'd been involved in had “found that a bulk of this cooling is attributed to intensive irrigation – mostly from groundwater – in a multi-cropping system in north India.”

We will need more research before we can make meaningful inferences about the cooling effect. But in the meantime, the warming continues, and how!



Soaking Seeds in Selenium Reduces Arsenic Content in Rice

May 15, 2018

By [Dr. Aditi Jain](#)

New Delhi, May 15: The presence of arsenic traces in rice is a major problem in several parts of the country. Now [scientists](#) have found that soaking rice seeds in selenium can mitigate adverse effects on rice plants grown in arsenic-contaminated soils and can arsenic accumulation in rice grains.

The Ganga-Meghna-Brahmaputra basin is a source of drinking water and irrigation but high arsenic content due to weathering of arsenic-rich natural rocks and other man-made activities is a serious issue. Arsenic exposure in humans occurs through consumption of contaminated water as well as through food grown on arsenic-contaminated soils or irrigated water. Exposure to arsenic causes a range of health problems.

Researchers from the Directorate of Weed Research, Jabalpur and the University of Kalyani, West Bengal have found that pre-soaking rice seeds in sodium selenite solution for twenty-four hours can reduce ill effects of arsenic on plant growth and stops the accumulation of arsenic in roots which is a non-edible part.

Arsenic contamination in soil or water inhibits the germination of seeds, reduces plant height, chlorophyll content, tiller and grain number. Scientists showed that selenium soaked seeds when planted on arsenic-rich soil were able to reverse this damage by confining arsenic to roots rather than translocating them to grains and other aerial parts. The confinement of arsenic to root was best observed by pre-soaking seeds in 1mg/l solution of sodium selenite where the arsenic accumulation in grains reduced by almost 38%, according to results of the study published in journal *Ecotoxicology and Environmental Safety*.

“Entry of arsenic in the plant body and subsequent transfer to the rice grain and finally to the consumers’ plate is of a big issue. A large-scale, seed soaking with selenium could emerge as an affordable and farmer-friendly mitigation option to address arsenic-induced damage in rice,” researchers explained.

The research team included Debojyoti Moulick and Subhas Chandra Santra from the University of Kalyani and Dr. Dibakar Ghosh from the Directorate of Weed Research, Jabalpur. ([India Science Wire](#))

Metal-organic nanosheets may help in the development of novel lens material: Report

[News-Analysis](#) Ratneshwar Thakur May 17, 2018 20:25 PM IST

Photochromic materials can change colour under stimulation of light. They are of high commercial importance in the ophthalmic lens industry and in sectors like optoelectronic switching devices, data storage, and optical transmission.



Photochromic materials change colours according to changes in the arrangement of atoms in materials. Atoms in photochromic materials are arranged in a certain manner and change when exposed to sunlight or UV light. We can observe this reversible behaviour in sunglasses. However, there are challenges associated with polymers. It is restricted by what features are desired in polymers in terms of rigidity, hardness, and scratch resistance. Presently, researchers achieve photoswitching by linking photochroms covalently to soft, low-molecular weight polymers.

A team of researchers at **Indian Institute of Technology (IIT), Kanpur** have demonstrated that porous 2-dimensional metal-organic nanosheets (MONs) constructed

from photochromic building blocks can also be employed as agents or dopants in polymers to bring out the desired optical properties in photochromic polymers.

Three-dimensional porous metal-organic framework materials (MOFs) have been used for various applications like photo-controlled gas storage, separations, sensing, and catalysis in recent years. However, they are not suitable for use in thin films and polymeric matrices to develop photo-responsive materials, as they pose problems like leaching and poor photoswitching.

The new photochromic 2D metal-organic nanosheets (MONs) are envisaged to be applicable not only in ophthalmic lenses, but also in other related applications, where light-induced switching between two or more species with different optical properties must occur smoothly.

Speaking to India Science Wire, leader of the team JN Moorthy said, “photo-responsive MONs can find applications in ophthalmic industry. As photo-chromes distributed in polymeric 2D nanosheets can be impregnated in rigid polymeric matrices, leaching of photo-chromes can be overcome, besides providing practical simplicity in terms of fabrication. The concept can also be exploited for photo-controlled sieving of organic molecules.”

Commenting on the work, Rahul Banerjee, a professor from Indian Institute of Science Education and Research (IISER), Kolkata, who was not involved in this study, said, “this is an interesting finding in which researchers could show that exfoliation of layered porous metal-organic frameworks (MOFs) using a top-down approach can help produce 2D metal-organic nanosheets (MONs). This type of crystal engineering approach is quite novel and could bring in novel and new applications in the field of MOFs.”

Gautam R. Desiraju, a professor from the Indian Institute of Science, Bangalore, who too was not involved in the study, said, “MOFs as a field is getting saturated and plateauing out. It may require a new vision over the next five to ten years. This subject is not associated with organic chemistry alone. Multi-disciplinary study of MOFs may move in advantageous directions in the future. Chemistry is looking for new paradigms, where the essence of the old is clubbed with a whole new superstructure, combining vertical and horizontal ways of thinking.”

The study has been published in the latest issue of journal *CHEM*. Besides JN Moorthy, the research team included Arindam Mukhopadhyay, Vijay Kumar Maka, and Govardhan Savitha. The study was funded by Science and Engineering Research Board (SERB) of the Department of Science and Technology (DST).

India Science Wire

दैनिक जागरण

अध्ययन

शोधकर्ताओं द्वारा किए अध्ययन में आया सामने, देश के कई जिलों में अधिक उत्पादन क्षेत्र के बावजूद प्रति हेक्टेयर उत्पादकता कम



नई रणनीति से देश में बढ़ सकता है मक्का का उत्पादन

नई दिल्ली, आइएसडब्ल्यू : देश के 14 जिले ऐसे हैं, जहाँ एक लाख हेक्टेयर से अधिक क्षेत्र में मक्के की खेती होती है। इन जिलों की उत्पादन क्षमता का सही उपयोग किया जाए तो मक्के के उत्पादन में बढ़ोतरी हो सकती है और पैदावार 2.3 मीट्रिक टन तक बढ़ सकती है। यह बात हैदराबाद स्थित केंद्रीय बारानी कृषि अनुसंधान संस्थान और अंतरराष्ट्रीय अर्ध-शुष्क ऊष्ण कटिबंधीय फसल अनुसंधान संस्थान (इक्रीसैट) के ताजा अध्ययन में सामने आई है।

देश के ज्यादातर मक्का उत्पादक जिलों में पैदावार क्षमता से काफी कम है। शोधकर्ताओं ने देश के 146 मक्का उत्पादक जिलों को 26 एक समान कृषि जलवायु क्षेत्रों में बाँटकर ऐसे क्षेत्रों की पहचान की है, जहाँ मक्का उत्पादन की क्षमता का भरपूर उपयोग अभी तक नहीं किया जा सका है।

इस अध्ययन से पता चला है कि देश के कई जिले ऐसे हैं, जहाँ उत्पादन क्षेत्र अधिक होने के बावजूद प्रति हेक्टेयर उत्पादकता बेहद कम है। राजस्थान के भीलवाड़ा, उदयपुर, बांसवाड़ा, गुजरात के सबारकांठा तथा पंचमहल और मध्य प्रदेश के झाबुआ जिले में उत्पादन क्षेत्र एक लाख हेक्टेयर से अधिक होने के बावजूद उत्पादकता दो टन प्रति हेक्टेयर से भी कम दर्ज की गई है। शोधकर्ताओं ने



पाया है कि उपयुक्त जलवायु दशाओं के बावजूद मक्के की कम उत्पादकता के लिए उन्नत किस्म के बीजों और पोषक तत्वों का उपयोग न होना भी प्रमुख कारण है। इस अध्ययन से स्पष्ट हुआ है कि मक्के के कम उत्पादकता वाले जिले उन्नत किस्म के बीजों के उपयोग में पिछड़े हुए हैं। इनमें जम्मू-कश्मीर के डोडा, बारामूला, कुपवाड़ा, बडगाम और उत्तर प्रदेश का गोंडा जिला शामिल है। वहीं, तमिलनाडु के थूथुकुडी जिले में उन्नत किस्म के बीजों के उपयोग की दर सर्वाधिक 100 प्रतिशत दर्ज की गई है, जबकि उत्तर प्रदेश के श्रावस्ती और बहराइच समेत अन्य कई जिलों में पोषक तत्वों के उपयोग में कमी उत्पादकता दर की बढ़ोतरी में प्रमुख बाधा बनी हुई है।

अध्ययन में शामिल प्रत्येक जिले में कम से कम 10 हजार हेक्टेयर क्षेत्र में मक्के की खेती होती है।

इसलिए शोध के दौरान 10 से 50 हजार हेक्टेयर, 50 हजार से एक लाख हेक्टेयर और एक लाख हेक्टेयर से अधिक मक्का उत्पादन क्षेत्र के आधार पर इन जिलों को तीन समूहों में बाँटा गया है। जिले में मक्के की उत्पादकता को भी अध्ययन में शामिल किया गया है, ताकि उत्पादन क्षेत्र और उत्पादकता की तुलना की जा सके।

अध्ययनकर्ताओं में शामिल डॉ. वीएएमके राजू के अनुसार, देश के अधिकतर क्षेत्रों में मक्के की खेती वर्षा आधारित है। वर्षा आश्रित क्षेत्रों में मक्का उत्पादन की दर 1.9 टन प्रति हेक्टेयर और सिंचित क्षेत्रों में यह दर 3.5 टन प्रति हेक्टेयर है। कई वर्षा आश्रित मक्का उत्पादन क्षेत्रों में उत्पादकता क्षमता मौजूद होने के बावजूद इसका उपयोग अभी नहीं किया जा सका है। इस अध्ययन का उद्देश्य मक्के की उत्पादकता में बढ़ोतरी की बाधाओं को दूर करना है।

वैज्ञानिकों के अनुसार, मौजूदा उत्पादन के मुकाबले वर्ष 2050 तक भारत में मक्का उत्पादन को माँग पाँच गुना तक बढ़ सकती है। फसल उत्पादन क्षेत्र में सीमित बढ़ोतरी के कारण पविष्य में मक्के की उत्पादकता बढ़ाना ही एकमात्र विकल्प हो सकता है। ऐसे में उन मक्का उत्पादक क्षेत्रों की पहचान जरूरी है, जहाँ उत्पादकता में बढ़ोतरी की संभावनाएँ मौजूद हैं।

Darjeeling Tea Faces Climate Risk

By Dinesh C Sharma



Tea plantations in Darjeeling, West Bengal (shankar s., CC BY 2.0 via Flickr)

Gradual change in temperature and rainfall patterns in Darjeeling hills is beginning to affect production of the famous Darjeeling tea.

The maximum temperature in Kurseong has risen by 0.51 degree over the last 20 years while total annual rainfall dropped by 56 mm and relative humidity by 16.07 %, leading to a decline in overall production of Darjeeling tea in terms of green leaf production per hectare.

This has emerged from studies conducted at the experimental farms of the Darjeeling Tea Research and Development Centre (DTR&DC) at Kurseong to see the effect of climate change on production of tea.

The West Bengal State Climate Action Plan has also expressed concern over “reduced productivity of Darjeeling tea due to increase in extended drought periods.” In other hill regions in the state, the plan has reported a decline in size and quality of citrus fruits like mandarin orange as a result of rising minimum temperature during the flowering season.

Tea is a rain fed crop that needs specific soil and air temperature as well as moisture condition for desired growth. Both increased temperatures and decreasing rainfall – along with change in relative humidity - adversely affect quantity and quality of tea production. The chances of pest infestation also go up with increase in temperature.

The ideal temperature for growing tea is between 18 and 30 degrees. The plant growth is adversely affected when the temperature goes above 32 degrees or drops below 13 degrees. In addition, strong winds, frequent frost, hail and excessive rainfall are also detrimental for production of high quality tea.

“Both excess and shortage of water affect growth of tea bushes. Tea bushes need adequate and well distributed rainfall. Heavy and erratic rainfall can damage tea plantation due to soil erosion, lack of growth due to less sunshine hours and different types of insect pest and diseases, besides flooding,” explained Mrityunjay Choubey , researcher from DTR&DC, while speaking at a media workshop on climate change here last week.

Tea is grown in five different valleys in the region – Darjeeling, Mirik, Teesta, Rambang and Kurseong – each having different elevation and weather pattern.

“There is no doubt that rainfall has come down drastically in all the valleys. But we have to collate data from all the stations, including those run by the India Meteorological Department and also analyse other factors such as shift from inorganic to organic farming and levels of absenteeism, before we can pinpoint reasons for falling production. Climate change may be one of the factors,” pointed out Prahalad Chetri, project director of the R&D centre, Tea Board of India, while speaking to India Science Wire.

Choubey, however, said that since the experimental farm followed the inorganic method of cultivation, yield reduction could not be attributed to shift from inorganic to organic cultivation practices. “The probable reason (for yield reduction) may be temperature rise, lack of total as well as distribution of rainfall and less humidity. These factors affect carbohydrate assimilation, respiration and evapotranspiration of tea plants, pest and disease infestation, drought and heavy rainfall incidence and soil degradation,” he added.

In view of this, he said, it was critical to identify and evaluate options for adaptation to future climate change. Adaptation measures will include use of drought-tolerant clones, reducing chemical load by integrated nutrient management. Organic farming is highly adaptable to climate change as it preserves inherent soil fertility and maintains organic matter in soils which can sustain productivity in the event of drought or irregular rainfall.

The workshop was jointly organized by Indian Himalayas Climate Adaptation Programme (IHCAP), Department of Science and Technology (DST) and Centre for Media Studies (CMS).

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SAMVADATA

News view and reviews

आगाज बदलाव का, महिलाओं के अनुकूल कृषि मशीनीकरण की नई पहल

May 18, 2018 Samvadata

वास्को-द-गामा : देश के कुल कृषि श्रमिकों की आबादी में करीब 37 प्रतिशत महिलाएं हैं। लेकिन, खेतीबाड़ी में उपयोग होने वाले ज्यादातर औजार, उपकरण और मशीनें पुरुषों के लिए ही बनाए जाते हैं। अधिकतर उपकरण महिलाओं की कार्यक्षमता के अनुकूल नहीं होते हैं। वैज्ञानिकों द्वारा महिलाओं के अनुकूल उपकरण और औजार बनाए जाने की पहल से यह स्थिति बदल सकती है।

विकास दर और बदलते सामाजिक-आर्थिक परिवेश जैसे कारकों को ध्यान में रखकर शोधकर्ताओं का अनुमान है कि वर्ष 2020 तक कृषि में महिला श्रमिकों की भागीदारी बढ़कर 45 प्रतिशत हो सकती है, क्योंकि ज्यादातर पुरुष खेती के कामों को छोड़कर शहरों की तरफ पलायन कर रहे हैं। ऐसे में भविष्य में महिलाएं ही कृषि में प्रमुख भूमिका निभाएंगी।

शोध पत्रिका करंट साइंस में प्रकाशित एक ताजा अध्ययन में महिला श्रमिकों की कार्यक्षमता के आधार पर तैयार किए गए आधुनिक कृषि औजारों और उपकरणों के बारे में विस्तार से जानकारी भी दी गई है, जिनका उपयोग महिलाएं सरलता और सहजता से कर सकती हैं।

इस अध्ययन में महिलाओं के लिए बनाए जाने वाले इन कृषि उपकरणों का डिजाइन तैयार करने के लिए शरीर के 79 आयामों की पहचान की गई है। काम करते समय शरीर की विभिन्न प्रमुख मुद्राओं, जैसे- खड़े होकर, बैठकर, झुककर आदि को दृष्टिगत रखते हुए कुल सोलह शक्ति मानकों का उपयोग कृषि मशीनरी डिजाइन करने में किया गया है। इनमें विशेष रूप से ध्यान रखा गया है कि उपकरण के उपयोग में उसे धक्का देना है या खींचना है और शरीर की मुद्रा विशेष में उपकरण के प्रयोग के समय हाथ की पकड़ और पैर की ताकत कितनी लग सकती है। इसके अलावा महिला श्रमिकों की ऊंचाई और वजन, कार्य करते समय अधिकतम ऑक्सीजन खपत दर, हृदय गति की दर, मांसपेशीय स्थैतिक क्षमता, हाथ की चौड़ाई, उंगलियों के व्यास, बैठकर काम करने की ऊंचाई और कमर की चौड़ाई जैसे आयामों को भी ध्यान में रखा गया है।

इन आयामों और महिलाओं की शारिरिक क्षमता के आधार पर पुराने प्रचलित कृषि उपकरणों को संशोधित करके कई नए उपकरण बनाए गए हैं। इनमें बीज उपचार ड्रम, हस्त रिजर, उर्वरक ब्राडकास्टर, हस्त चालित बीज ड्रिल, नवीन डिबलर, रोटरी डिबलर, तीन पंक्तियों वाला चावल ट्रांसप्लांटर, चार पंक्तियों वाला धान ड्रम सीडर, व्हील हो, कोनो-वीडर, संशोधित हंसिया, मूंगफली स्ट्रिपर, पैरों द्वारा संचालित धान ग्रेशर, धान विनोवर, ट्यूबलर मक्का शेलर, रोटरी मक्का शेलर, टांगने वाला ग्रेन क्लीनर, बैठकर प्रयोग करने वाला मूंगफली डिकोरटिकेटर, फल हार्वेस्टर, कपास स्टॉक पुलर और नारियल डीहस्कर प्रमुख हैं।

शोधकर्ताओं के अनुसार, भारतीय महिला कृषि श्रमिकों की औसत ऊंचाई आमतौर पर 151.5 सेंटीमीटर और औसत वजन 46.3 किलोग्राम होता है। खेती के कामों में भार उठाने संबंधी काम बहुत होते हैं। वर्ष 2004 में अर्गोनॉमिक्स जर्नल में छपे एक शोध में आईआईटी-मुंबई के वैज्ञानिकों के एक अनुसंधान के अनुसार भारतीय वयस्क महिला श्रमिकों को 15 किलोग्राम (अपने भार का लगभग 40 प्रतिशत) से अधिक भार नहीं उठाना चाहिए।

केन्द्रीय कृषि अभियांत्रिकी संस्थान, भोपाल से जुड़े प्रमुख अध्ययनकर्ता डॉ. सी.आर. मेहता ने इंडिया साइंस वायर को बताया कि “पिछले कुछ वर्षों में महिला कृषि श्रमिकों की उच्च भागीदारी और कृषि प्रौद्योगिकियों के बदलते परिदृश्य में महिलाओं के अनुकूल औजारों, उपकरणों के साथ-साथ कार्यस्थलों के विकास पर अधिक ध्यान दिया जाने लगा है। अब ऐसे उपकरण तैयार किए गए हैं, जिससे महिलाएं भी आधुनिक कृषि तकनीक का लाभ उठा सकें।”

डॉ. मेहता के अनुसार, इन उपकरणों के उचित और सुरक्षित संचालन हेतु महिला श्रमिकों को जागरूक और प्रशिक्षित करना, निर्माताओं तथा उद्यमियों को इन कृषि औजार बनाने के लिए प्रोत्साहित करना और उन्हें उपयोगकर्ताओं द्वारा खरीद के लिए ग्रामीण क्षेत्रों में उपलब्ध कराया जाना जरूरी है। उपकरण खरीदने के लिए बैंकों तथा अन्य संगठनों से ऋण प्राप्त करने के लिए महिलाओं की सहायता भी आवश्यक है।

केन्द्रीय कृषि अभियांत्रिकी संस्थान, भोपाल के ही एक अन्य वरिष्ठ कृषि वैज्ञानिक डॉ. गीते के अनुसार श्रम उत्पादकता बढ़ाने और महिला श्रमिकों के कठोर परिश्रम को कम करने के लिए बेहतर प्रौद्योगिकी को बढ़ावा देने के लिए केंद्र एवं राज्य सरकार के विभाग, अनुसंधान और विकास संस्थान तथा गैर सरकारी संगठनों को आगे आना चाहिए। उन्हें कृषि महिलाओं को प्रौद्योगिकियों के प्रभावी हस्तांतरण के लिए महिला कर्मचारियों की भर्ती भी करनी चाहिए। राज्य कृषि विभागों को इस गतिविधि में मुख्य भूमिका निभानी होगी, क्योंकि उनके पास ग्रामीण स्तर पर कार्यकर्ता होते हैं।

इस संबंध में मध्यप्रदेश के उज्जैन जिले के बड़नगर में कार्यरत ग्रामीण कृषि विस्तार अधिकारी उदय अग्निहोत्री ने इंडिया साइंस वायर को बताया कि “इस तरह के उपकरणों का प्रचलन तेजी से गांवों में बढ़ रहा है। हालांकि, पहले से पुराने औजारों का इस्तेमाल कर रही महिलाओं को आधुनिक उपकरणों से काम करने में शुरू में हिचकिचाहट होती है, पर धीरे-धीरे प्रशिक्षण के माध्यम से उन्हें इन औजारों का उपयोग आसान लगने लगता है।”

मध्यप्रदेश के सतना जिले के किसान लक्ष्मीनारायण मिश्र के अनुसार, परिवार में खेतों के बंटवारे के कारण जोतों का आकार छोटा हो रहा है। इस कारण व्यावहारिक और आर्थिक दृष्टिकोण से बड़े कृषि उपकरणों और मशीनरी का उपयोग लाभदायक साबित नहीं हो पाता। पुरुषों के अन्य व्यवसायों में संलग्न होने से भी गांवों में ज्यादातर महिलाएं ही खेती के काम करती हैं। महिला कृषकों के अनुकूल छोटे-छोटे कृषि उपकरण तैयार होना एक अच्छा कदम है, इससे उनको काम करने में आसानी होगी, उनकी भागीदारी बढ़ेगी और उनकी कार्यक्षमताओं का पूरा उपयोग हो सकेगा।

HEALTH

Scientists gain new insight into neurodegenerative diseases using fruit flies

By SUNDERARAJAN PADMANABHAN

A team of scientists from India, Ireland and America has uncovered novel role of a protein, Ataxin-2, in initiation and progression of neurodegenerative diseases - Amyotrophic Lateral Sclerosis (ALS) and Spinocerebellar Ataxia Type 2 (SCA2).

ALS affects nerve cells in the brain and spinal cord, causing muscle weakness. It makes it difficult to perform basic functions like walking, eating, and speaking. Closely related to it is SCA2 that slows down the activity in the part of the brain that controls voluntary activities such as coordination, balance, and speech. Scientists have been engaged in understanding risk factors for onset for such diseases.

The study - led by Dr. Baskar Bakthavachalu at National Centre for Biological Sciences (NCBS) in Bangalore - focused on a particular protein domain of Ataxin-2 known as the intrinsically disordered region (IDR) which assists Ataxin-2 in the formation of granules inside neurons. These researchers were interested to know if IDR regions of Ataxin-2—and indirectly, the granules—had any role in promoting neurological dysfunctions.

The researchers performed studies in fruit fly (*Drosophila*) which has a single copy of the Ataxin-2 gene, in contrast to mammals, which have multiple copies. A single copy of the gene



National Center for Biological Sciences at Bengaluru

makes it convenient to study what would be the impacts, if it was to be deleted.

It was found that IDR assists granule formation by controlling the stability and strength of Ataxin-2 interactions with other cellular components and results in aggregation. Fruit flies which had Ataxin-2 IDR deleted were fully normal except being deprived of their ability to form granules. "The main caveat in the field had been non-existence of a system that could discriminate the function of the granule without interfering with the other important functions of

The scientists also took cues from earlier research studies which had demonstrated that reduced Ataxin-2 levels in mice pre-disposed to ALS-like illness slowed down their onset and progression of neurodegeneration...

Ataxin-2. We overcame this lacuna with genome engineering a fly model where these two described functions were separable," Dr Baskar explained.

The scientists also took cues from earlier research studies which had demonstrated that reduced Ataxin-2 levels in mice pre-disposed to ALS-like illness slowed down their onset and progression of neurodegeneration. They wondered if reduced neurodegeneration could be attributed to the lack of granule formation or if it was a property of other functions of Ataxin-2.

The team found that the Ataxin-2 IDR-assisted granules facilitate its association with other pathogenic proteins known to endorse neurodegeneration. Thus, deletion of the IDR domain, thereby inhibiting granule formation, was sufficient to prevent neurotoxicity. They also proved that Ataxin-2 contributed to long-term memory in fruit flies via the IDR-granule connection and that Ataxin-2 plays a vital role in the rewiring of the nervous system.

Thus the study has shown that it is the IDR domain of Ataxin-2 that allows development of long term memory even as it, paradoxically, results in specific forms of neurodegeneration. "One possible explanation is that, mechanisms that allow granule fluxes (formation and clearance) under normal scenarios are tilted towards granule accumulation in diseased conditions," said Dr. Baskar.

The research results have been published in journal *Neuron*. The team included Prof K.VijayRaghavan, Dr. Mani Ramaswami, Indulekha P.Sudhakaran, Amanjot Singh, Devasena Thiagarajan and M.Sankaranarayanan (all from NCBS); Dr. Joem Huelmeier, Dr. Jens Hillebrand, and Dr. Amas Petrauskas (Trinity College, Dublin); Laura Mizoue and Roy Parker (University of Colorado); and Udai Bhan Pandey and Eric N. Anderson (University of Pittsburgh School of Medicine). (*India Science Wire*)

Training health workers can help manage hypertension in villages

A new study done by Indian and Australian researchers has found that training available workforce such as Accredited Social Health Activists (ASHAs) could be effective in rural areas

May 19, 2018



[By Jyoti Singh](#)

New Delhi: Hypertension has emerged as a major health problem in India with one in four Indians suffering from it. Early detection and management of hypertension is necessary to prevent complications such as cardiovascular disease. However, it is a challenge given the shortfall of trained health workforce, particularly in rural areas.

A new study done by Indian and Australian researchers has found that training available workforce such as Accredited Social Health Activists (ASHAs) could be effective in rural areas. Researchers led by Prof Amanda Thrift from Monash University developed a training package for health workers and evaluated its effectiveness. The training module helps health workers identify and control hypertension in the community. The study measured effectiveness of the tool in terms of knowledge, skills and perception of health workers.

The study was conducted in Trivandrum in Kerala, West Godavari and Rishi Valley in Andhra Pradesh. “We selected these places based on quality of health workforce available there. Trivandrum has good healthcare facilities, while West Godavari has average and Rishi Valley has poor facilities,” mentioned Pallab Kumar Maulik, a member of the research team.

As part of the study, 15 ASHAs attended a five-day training workshop that was delivered using interactive instructional strategies. They then led community-based education support groups for three months. Training materials incorporated details on managing hypertension, goal setting, facilitating group meetings, and measuring blood pressure and body weight. “We have introduced some very simple lifestyle interventions like how to talk with people, how to measure blood pressure, risks of hypertension, utility of measuring blood pressure etc.,” Dr Maulik said.

The training was designed to provide ASHAs with knowledge regarding hypertension and its factors, strategies to manage hypertension via knowledge about healthy lifestyle and adherence to medications, and skill in facilitation of group meetings. Health workers were also taught to deliver community group-based education, and provide support for individuals with hypertension. After the training, researchers found that ASHAs’ knowledge of hypertension improved from a mean score of 64% before training to 76% post-training and 84% after the three-month intervention.

Dr Maulik said results of the study would be shared with Indian Council of Medical Research (ICMR). “We hope the government will further use this to improve health facilities particularly in rural areas,” he added. According to him, it was not only health workers but communities also responded positively.

The research team included Marwa Abdel, Clara K. Chow, Pallab Kumar Maulik, Rama Guggilla, Rohina Joshi (George institute, Australia and India); Amanda Gay Thrift, Michaela Riddell, Oduru Suresh, Roger George Evans (Monash University); Ajay Mahal, Brian Oldenburg (University of Melbourne); Kavumpurathu Raman Thankappan, Gomathyamma Krishnakurup Mini (Sree Chitra Tirunal Institute for Medical Sciences and Technology); Kartik Kalyanram and Kamakshi Kartik (Rishi Valley Rural Health Centre) and Nihal Thomas (Christian Medical College, Vellore). The study has been published in journal BMC Health Services Research. **(India Science Wire)**



Research Stach

Indian School Kids Shine at Intel Science Fair

Young innovators from India proved their mettle once again with many of them winning top awards at the just concluded annual [International Science and Engineering Fair](#) organized by IT major Intel at Pittsburgh in the USA from May 12 to May 18.

Two teams – C.S.Mohammed Suhail and Swasthik Padma of Mangalore and Pranav Shikarpur and Siddharth Viswanath of Bengaluru have won the second place grand awards of \$1,500 each.

Suhail and Swasthik have won the award in the category of translational medicine for developing an ultra-low-cost pre-symptomatic diagnostic paper tool for protein-energy malnutrition. Suhail is from St Aloysius Pre-University College and Swasthik from Vivekananda Pre-University College.

Pranav and Siddharth, in turn, have won the award in the category of Earth and Environmental Sciences for developing a portable and floating real-time data acquisition device for lake water quality monitoring and mapping. The two are from Bangalore International Academy, Bengaluru. They have also won the [US Agency for International Development](#) (USAID)'s first place award of \$5,000.

Besides the two teams, Ishita Mangla of Delhi Public School, R.K.Puram, New Delhi, has won the third place grand award of \$ 1,000 and a scholarship from the University of Amazon for developing an automated and inexpensive solution for visual acuity testing in pre-verbal children using Deep Convolutional Neural Networks.

The other award winners are: Kaushik Kunal Singh of [Inventure Academy, Bengaluru](#) (grand award fourth place of \$500, USAID's award of \$5,000, [China Association of Science and Technology](#)'s award of \$1,200, Samvid Education Foundations's award of \$500) Shinji Ghosh of South Point High School, Kolkatta (grand award fourth place of \$500), Parth Raghav of K.R.Mangalalam World School, New Delhi (Association of Computing Machinery's award of \$3,000 and King Abdulaziz Foundation's award of \$1,000), Sachet Sathyanarayanan of National Public School, Chennai (Mu Alpha Theta award of \$1,500) and Akash Manoj of The Ashok Leyland School, Hosur (Samvid Education Foundation's award of \$ 500).

In all, 25 school students of class 8 to 12 from different parts of the country had participated in the global fair pitting their brains against other children from 78 countries. The children had been selected after several rounds of rigorous screening.

The programme is part of a public-private partnership between the [Department of Science and Technology](#), the [Indo-US Science and Technology Forum](#) and Intel known as the [Initiative for Research and Innovation in Science \(IRIS\)](#). The students compete in 17 subject categories in this annual event.

(India Science Wire)



EASTERN MIRROR

More News, More Truth

New Technology To Detect Chikungunya Virus

May 21, 2018 / Comments Off on New Technology To Detect Chikungunya Virus

Umashankar Mishra | India Science Wire

Indian scientists have developed a biosensor technique which can be potentially help in detecting Chikungunya virus. According to the scientists, the technique can be used to develop a point of care device for rapid identification of the dreaded disease.

This technique is based on molybdenum disulphide nanosheets. The researchers synthesized the nanosheets by chemical route and characterized them by using scanning electron microscopy, transmission electron microscopy, UV-visible spectroscopy, Raman spectroscopy and X-ray Diffraction. Molybdenum disulphide nanosheets were then subjected to physical adsorption onto the screen printed gold electrodes and then employed for the detection of chikungunya virus DNA using electrochemical voltammetric techniques.

This study has been jointly carried out by researchers of Amity University, Noida, Jamia Millia Islamia University, Delhi and Maharishi Dayanand University, Rohtak. The research team has published a report on the study in the recent issue of research journal Scientific Reports.

Conventionally, Chikungunya is detected through RT-PCR (Real-time polymerase chain reaction) from serum samples or by determination of serum antibodies. These methods are time consuming and the procedure is cumbersome. Thus, there is a need for a rapid and point-of-care diagnostic tool.

“Advantages like rapid response time and suitability for mass production associated with detection of DNA hybridization have triggered development of DNA-based electrochemical biosensors. These advantages motivated the present work. A practical advantage of electrochemical detection could have future implications in translating to cheap assays using single-use screen-printed electrodes, which is an ideal tool due to their low cost, disposability and design flexibility as compared to traditional electrode materials”, the researchers said.

However, some other experts felt that the technique was not a new idea as it was used commonly for developing biosensors. Prof. Ashok Kumar, scientist at New Delhi based CSIR's Institute of Genomics and Integrative Biology, who was not involved in the study, told India Science Wire, "In this study researchers are detecting synthesized small fragments of cDNA and not taking RNA samples from chikungunya which is essential for diagnosis of disease. They have just hybridized with complementary strands of DNA. Even validation was carried out using spiked DNA samples in blood serum which is not correct for real samples. Sensitivity of the sensor cannot be applicable with real samples of RNA of the patients."

The research team consisted of Dr. Chaitali Singhal, Manika Khanuja, Nahid Chaudhary, C.S. Pundir and Jagriti Narang.

(India Science Wire)

अब आ गई है चिकनगुनिया वायरस को पहचानने की नई तकनीक



उमाशंकर मिश्र

भारतीय वैज्ञानिकों को बायोसेंसर आधारित ऐसी तकनीक विकसित करने में सफलता मिली है, जो [चिकनगुनिया वायरस](#) की पहचान में मददगार हो सकती है। वैज्ञानिकों के अनुसार, इस तकनीक का उपयोग चिकनगुनिया की त्वरित पहचान के लिए प्वाइंट ऑफ केयर उपकरण बनाने में किया जा सकता है।

इस तकनीक में मोलिब्डेनम डाईसल्फाइड नामक रासायनिक तत्व से बनी नैनोशीट्स का उपयोग किया गया है और स्क्रीन प्रिंटेड गोल्ड इलेक्ट्रॉड पर इन नैनोशीट्स को लगाया गया है। शोधकर्ताओं ने नैनोशीट्स का संश्लेषण रासायनिक विधि से किया है और स्कैनिंग इलेक्ट्रॉन माइक्रोस्कोपी, अल्ट्रावॉयलेट-विजिबल स्पेक्ट्रोस्कोपी, रामन स्पेक्ट्रोस्कोपी और एक्स-रे डिफ्रैक्शन पद्धतियों से इसके गुणों का परीक्षण किया गया है। जैव-रासायनिक वोल्तामीट्रिक तकनीक से चिकनगुनिया वायरस के डीएनए की पहचान की गई है।

एमिटी विश्वविद्यालय, नोएडा, जामिया मिल्लिया इस्लामिया विश्वविद्यालय, दिल्ली और महर्षि दयानंद विश्वविद्यालय, रोहतक के शोधकर्ताओं द्वारा यह अध्ययन किया गया है। अध्ययन से जुड़े वैज्ञानिकों के मुताबिक, “इस शोध में स्क्रीन प्रिंटेड गोल्ड इलेक्ट्रॉड लेपित मोलिब्डेनम डाईसल्फाइड नैनोशीट्स को डीएनए बाइंडिंग के लिए प्रभावी पाया गया है।”

CHIKUNGUNYA



वायरल बुखार से पीड़ित मरीज में चिकनगुनिया के संक्रमण का पता लगाने के लिए आमतौर पर आरटी-पीसीआर (रियल टाइम-पालिमर चेन रिएक्शन) जांच से रक्त के नमूनों में चिकनगुनिया आरएनए की मौजूदगी का परीक्षण किया जाता है। इस विधि से जांच के लिए विशेषज्ञ और आधुनिक उपकरण की जरूरत होती है। मरीज को बुखार आने के दूसरे या तीसरे दिन आरटी-पीसीआर जांच कर चिकनगुनिया का पता लग पाता है।

शोधकर्ताओं के अनुसार, “डीएनए संकरण (हाइब्रिडाइजेशन) आधारित विस्तृत पैमाने पर उत्पादन और त्वरित प्रतिक्रिया जैसी विशेषताओं के कारण वैज्ञानिक जैव-रासायनिक बायोसेंसर्स का विकास करने में जुटे हैं। इसी तथ्य पर केंद्रित इस शोध में जैव-रासायनिक डीएनए बायोसेंसर का विकास किया गया है।”

कुछ अन्य विशेषज्ञों का मानना है कि यह तकनीक बायोसेंसर विकसित करने की एक सामान्य प्रक्रिया है और इसमें नए आइडिया का उपयोग नहीं किया गया है। नई दिल्ली स्थित इंस्टीट्यूट ऑफ जीनोमिक्स ऐंड इंटीग्रेटिव बायोलॉजी से जुड़े प्रोफेसर अशोक कुमार ने [इंडिया साइंस वायर](#) को बताया कि “अध्ययन में पूरक डीएनए (सीडीएनए) के खास संश्लेषित हिस्सों की पहचान की गई है और चिकनगुनिया की पहचान के लिए जरूरी राइबोज न्यूक्लिक अम्ल (आरएनए) नमूनों का उपयोग नहीं किया गया है। रक्त सीरम से प्राप्त स्पाइकड डीएनए नमूने के उपयोग से की गई वैधता जांच भी वास्तविक नमूनों के अनुरूप नहीं है।”

अध्ययनकर्ताओं में चैताली सिंघल, मनिका खनूजा, नाहिद चौधरी, सी.एस. पुंडीर और जागृति नारंग शामिल थे। यह अध्ययन शोध पत्रिका साइंटिफिक रिपोर्ट्स में प्रकाशित किया गया है।



Uncovering a puzzle of macrophage activation

By Ratneshwar Thakur Published on 24, May, 2018

Macrophages - derived from the Greek word meaning large eaters' - are one of the sentinels of human immune system that engulf pathogens and degrade them and also alert other sentinels about presence of foreign pathogens. However, in some cases uncontrolled or hyper-activation of macrophages can cause cancer or autoimmune disorders.

Researchers are trying to shed light on how macrophages get activated so as to help control such problems. Scientists at the Institute of Microbial Technology (IMTECH), Chandigarh have found that a protein called Arf-like (Arl) GTPase-11(Arl11) activates macrophages in response to pathogenic stimuli. In a paper published in Journal of Biological Chemistry, they have reported that the protein is essential for macrophages to kill foreign pathogens.

“We worked on this particular protein as previous studies had found it to be missing in tumour cells but its function was not known. We were surprised to know that it is expressed in many immune cells including macrophages, and therefore set out to know what would be the function of Arl11 in macrophages,” Dr Amit Tuli, who led the research team, told India Science Wire.

The study throws light on cellular function of Arl11, which is an evolutionarily conserved protein. “We found that the expression of Arl11 increases when macrophages encounter pathogens and that this is required to initiate a cascade of events that finally result in activation of macrophage,” explained Subhash B. Arya, a member of the research team.

Understanding how immune system functions is crucial not only for immunotherapy, such as, against cancer but also to understand inflammation that damages normal tissues. The study

found that by increasing Arl11 expression in macrophages can activate them. “It will be highly relevant to study Arl11 expression changes in diseases such as autoimmune disorders, atherosclerosis and obesity”, added Dr. Tuli.

Commenting on the work, Prof. Somdatta Sinha from Indian Institute of Science Education and Research (IISER), Mohali, who was not associated with the study, said, “the study has found a novel and interesting relation between a gene that is known to be related to familial risk of different types of cancers, to its role in responding to bacterial pathogen in certain immune cells. The molecular elucidation of pathways of interactions of this gene can, in the long run, tell us ways that immune system functions in handling different types of diseases.”

The research team included Subhash B. Arya, Gaurav Kumar, Harmeet Kaur and Amandeep Kaur. This work was supported by the Wellcome Trust/Department of Biotechnology (DBT) India Alliance and CSIR-IMTECH intramural funding.

(India Science Wire)



GS TIMES

General Study Destination for IAS & State PCS Exams

Coral bleaching of 2016 caused severe mortality in Gulf of Mannar: study

📅 May 23, 2018 👤 admin

By Dr Ravi Mishra

Vasco-da-Gama, May 23 (India Science Wire): Corals lose their beautiful colours and even die during a coral bleaching event. The corals in the Gulf of Mannar suffered severe losses during the global coral bleaching event that occurred between March and October 2016, according to new data published now.

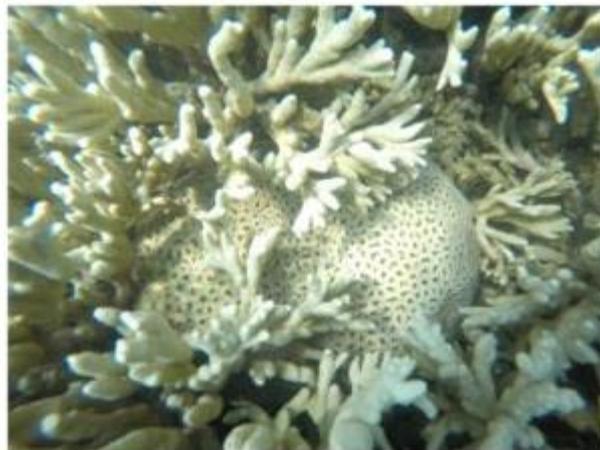
A joint team of researchers from Suganthi Devadason Marine Research Institute, Gulf of Mannar Marine National Park and Department of Environment of Tamil Nadu, which conducted intensive underwater surveys, has found high extent of coral bleaching and subsequent mortality. The study results have been published in journal *Current Science* this month.



Coral Acroporacytherea

Coral bleaching refers to loss of zooxanthellae which gives colour to corals. The absence of it makes corals white or bleached. Coral bleaching is a general response of corals in increased sea surface temperature. "Bleaching can happen when sea surface temperatures increase by 1 to 2 degree Celsius. Coral would recover if normal temperature returns within a short period, but if the temperature stress continues for a long term, corals will eventually die," explained Dr Patterson Edward, director of SuganthiDevadason Marine Research Institute, while speaking to *India Science Wire*.

Corals are marine animals, typically living in compact colonies, while coral reefs are the diverse underwater ecosystems built by coral colonies. Coral reefs have the highest biodiversity of any marine ecosystem, providing important and direct economic benefits to people. In the past few decades, coral reefs have undergone a dramatic degradation due to various natural and human-induced activities.



Coral Montiporadigitata

Scientists observed 24 percent coral bleaching with 16 percent mortality and live coral cover decrease to 23 percent during March to June 2016. The water temperature was recorded between 31.2 to 32.6 degree Celsius, which started decreasing in July 2016 and it reached around 27 degree in October 2016.

The rate of mortality varied with coral species. The fast-growing species such as *Acropora*, *Montipora* and *Pocillopora* have severe mortality, while massive and slow growing species of corals, like *Porites*, *Favia* and *Favites* are resistant to the bleaching and escaped death.

"The local annual variation of coral cover and coral bleaching occur during the late April, when sea surface temperature rises 2 to 3 degree, but they tend to recover within a period of three months when the normal temperature returns. In general, annual bleaching event does not cause mortality. The coral bleaching and severe mortality during 2010 and 2016 are due to global coral bleaching events" Dr. Diraviya Raja, a member of the research team, told *India Science Wire*.



Mixed coral species Acroporanobilis, Acroporaformosa, Acroporocytherea and Goniastrea sp.

Gulf of Mannar is one of the four major coral reef areas in India with 117 coral species, formed mainly around 21 uninhabited islands situated between Rameswaram and Tuticorin. The coral reef area declared as the Gulf of Mannar Marine National Park has been monitored since 2003. The first global bleaching event had occurred in 1998. Increase in global average temperature during the past few decades, become a major threat to the reefs for coral bleaching and mortality.

The research team included J. K. Patterson Edward, G. Mathews, K. Diraviya Raj, R. L. Laju, M. SelvaBharath, A. Arasamuthu, P. Dinesh Kumar, Deepak S. Bilgi and H. Malleshappa

Twitter handle: @Ravimishra1970

(India Science Wire).

शास्त्रियत

भारतीय गणितज्ञ, जिन्होंने आइंस्टीन के सिद्धांत का किया सरलीकरण



नई दिल्ली, (इंडिया साइंस वायर): प्रसिद्ध भारतीय भौतिक विज्ञानी, गणितज्ञ और शिक्षाविद प्रहलाद चुन्नीलाल वैद्य का गणित के क्षेत्र में अंतरराष्ट्रीय स्तर पर महत्वपूर्ण योगदान है। सापेक्षता के सामान्य सिद्धांत में योगदान के लिए उन्हें खासतौर पर याद किया जाता है। आइंस्टीन का गुरुत्वाकर्षण का सिद्धांत पेचीदा गणितीय समीकरणों के रूप में व्यक्त होता है। इन समीकरणों को हल करना काफी कठिन था। प्रहलाद चुन्नीलाल वैद्य ने इस समीकरण को हल करने की कोशिश की और उसमें वह काफी सफल रहे। उन्होंने आइंस्टीन के सापेक्षता सिद्धांत का सरलीकरण करने में अहम योगदान दिया। आज उनके द्वारा विकसित विधि 'वैद्य मेट्रिक' के नाम से प्रसिद्ध है। इस विधि में उन्होंने विकिरण उत्सर्जित करने वाले किसी तारे के गुरुत्वाकर्षण के सन्दर्भ में आइंस्टीन के समीकरणों को हल किया। उनके इस कार्य ने आइंस्टीन के सिद्धांत को समझने में मदद दी।

प्रहलाद चुन्नीलाल वैद्य का जन्म 23 मई, 1918 को गुजरात के जूनागढ़ जिले के शाहपुर में हुआ था और उनकी प्रारंभिक शिक्षा भावनगर में संपन्न हुई। गणित में विशेष रुचि होने के कारण उन्होंने बम्बई विश्वविद्यालय से अनुप्रयुक्त गणित में विशेषज्ञता के साथ एम.एस.सी. की डिग्री प्राप्त की। वैद्य अपने समय के प्रसिद्ध भौतिकविद और शिक्षाविद विष्णु वासुदेव नार्लीकर से बहुत प्रभावित थे।

उस दौर में विष्णु वासुदेव नार्लीकर के साथ कार्य करने वाले शोधार्थियों के समूह की पहचान सापेक्षता केन्द्र के रूप में विख्यात हो चुकी थी। वैद्य भी उनके दिशा-निर्देश में इस क्षेत्र में शोधकार्य करना चाहते थे। इसलिए वैद्य बनारस हिन्दू विश्वविद्यालय गए। वहां उन्होंने श्री विष्णु वासुदेव नार्लीकर के दिशा-निर्देशन में सापेक्षता सिद्धांत पर शोधकार्य शुरू कर दिया तथा 'वैद्य सॉल्यूशन' प्रस्तुत किया। इस

सिद्धान्त की प्रासंगिकता को मान्यता साठ के दशक में मिली, जब खगोल-विज्ञानियों ने ऊर्जा के घने, मगर शक्तिशाली उत्सर्जकों की खोज की। जैसे ही सापेक्षतावादी खगोल भौतिकी को मान्यता मिली, वैसे ही 'वैद्य सॉल्यूशन' को सहज ही अपना स्थान हासिल हो गया और विज्ञान के क्षेत्र में वैद्य को ख्याति मिली।

वैद्य एक मशहूर गणितज्ञ होने के साथ ही एक शिक्षाविद भी थे। वह चाहते थे कि गणित बच्चों के लिए सुगम व रुचिकर बने। इसके लिए उन्होंने अनेक प्रयास किए। उनका मानना था कि गणित सिखाना शायद कठिन है, मगर गणित सीखना कठिन नहीं है क्योंकि यह हमारी संस्कृति का अभिन्न अंग रहा है। उन्होंने गुजराती तथा अंग्रेजी में विज्ञान और गणित की कई प्रसिद्ध पुस्तकों का लेखन किया, जैसे, 'अखिल ब्राह्मांडमैन', जिसका अर्थ है सम्पूर्ण ब्रह्मांड में, तथा 'व्हाट इज मॉडर्न मैथमेटिक्स'।

वर्ष 1947 तक उन्होंने सूरत, राजकोट, मुम्बई आदि जगहों पर गणित के शिक्षक के रूप में कार्य किया। इस दौरान उन्होंने अपनी शिक्षा भी जारी रखी। वर्ष 1948 में उन्होंने बम्बई विश्वविद्यालय से अपनी पी.एच.डी. पूरी कर ली। अपना रिसर्च कार्य उन्होंने नव स्थापित टाटा मूलभूत अनुसंधान संस्थान से किया। यहीं उनकी मुलाकात प्रसिद्ध वैज्ञानिक डॉ. होमी जहांगीर भाभा से हुई थी।

कुछ समय बाद मुम्बई छोड़कर वह अपने गृह राज्य गुजरात लौट आए। वर्ष 1948 में उन्होंने बल्लभनगर के विट्टल महाविद्यालय में कुछ समय तक शिक्षण कार्य किया। फिर वह गुजरात विश्वविद्यालय में गणित के प्रोफेसर नियुक्त हुए। वैद्य ने अपना पूरा जीवन एक समर्पित शिक्षक के रूप में बिताया। वह हमेशा खुद को एक गणित शिक्षक कहे जाने पर गर्वान्वित महसूस करते थे। प्रशासनिक प्रतिबद्धताओं के बावजूद वह विद्यार्थियों को पढ़ाने के लिए समय निकाल ही लेते थे।

वर्ष 1971 में उन्हें गुजरात लोकसेवा आयोग का सभापति नियुक्त किया गया। फिर वर्ष 1977-78 के बीच वह केन्द्रीय लोकसेवा आयोग के भी सदस्य रहे। 1978-80 के दौरान वह गुजरात विश्वविद्यालय के उपकुलपति रहे। वैद्य ने गुजरात गणितीय सोसायटी के गठन में महत्वपूर्ण भूमिका निभाई। विक्रम साराभाई कम्प्यूनिटी साइंस सेंटर के विकास में भी उनका अहम योगदान था। इंडियन एसोसिएशन फॉर जनरल रिलेटिविटी ऐंड ग्रेविटेशन (आईएजीआरजी) की स्थापना में भी वैद्य ने महत्वपूर्ण भूमिका निभायी थी। वर्ष 1969 में स्थापित इस संस्था के संस्थापक अध्यक्ष सर विष्णु वासुदेव नार्लीकर थे।

उन्हें स्वतंत्रता के बाद भारत में गांधीवादी दर्शन के अनुयायी के रूप में जाना जाता है। वैद्य, गांधीजी के विचारों से प्रेरित होकर आजादी के आन्दोलन में भी शामिल रहे। उन्होंने गांधीवादी विचारों को अपनाते हुए खादी का कुर्ता और टोपी को धारण किया। उपकुलपति के पद पर रहते हुए भी सरकारी कार का उपयोग करने से मना कर दिया और विश्वविद्यालय आने-जाने के लिए साइकिल का ही उपयोग करते रहे। 12 मार्च, 2010 को 91 वर्ष की आयु में प्रहलाद चुन्नीलाल वैद्य का निधन हो गया। प्रहलाद चुन्नीलाल वैद्य के योगदान को देखते हुए विज्ञान संचार के लिए समर्पित संस्था विज्ञान प्रसार द्वारा उन पर एक वृत्तचित्र का भी निर्माण किया गया है।

(इंडिया साइंस वायर)



Deciduous trees with compound leaves more tolerant to air pollution: study



By Dr Aditi Jain

Degrading air quality in metro cities is a matter of concern for public health. Massive tree plantation drives are often conducted in order to provide oxygen to choking cities. But trees, much like humans, are also severely affected by pollutants in the air.

In such a situation, knowledge about trees capable of withstanding heavily polluted environment is needed, particularly while designing green belts in urban areas. A new study done by researchers at the Banaras Hindu University (BHU) might help in this regard. The study has deciphered impact

of air pollution on health of various trees, and identified trees hardy enough to tolerate stress induced by [air pollution](#).



Arideep Mukherjee working in the field with canopy analyzer

The researchers selected three regions with a variable degree of pollution levels – residential, traffic and industrial site – in Varanasi. They found that levels of particulate (total suspended particles, Particulate Matter 10) and gaseous pollutants (nitrous oxide, sulphur dioxide, ozone) were 1.4 to 2.5 times more in the areas with traffic and the industrial site compared to the residential location. The levels of most pollutants were high during winters followed by summers and monsoon months, except ozone which was higher in summers. The study was performed for six successive seasons for two years.

In all, thirteen tree species that were present in all the three sites were selected to study impact of air pollution on them. Around fifteen leaf

parameters such as antioxidant status, leaf water status, photosynthetic pigment etc. and tree characteristics were studied at all the sites.

The results showed that particulate matter and ozone were the most damaging to trees, causing maximum variability in their characteristics. Of all the studied trees, *Caesalpinia sappan* (Indian redwood) was found to be the most tolerant followed by *Psidium guajava* (yellow guava), *Dalbergia sissoo* (shisham) and *Albizia lebbek* (saras). These tree species showed an increase in antioxidants, pigments and relative water status with increase in pollution load.

Tolerance and pollution response were regulated by different tree characteristics such as height, canopy size, leaf form, texture and nature of the tree. The analysis showed that deciduous trees, with compound leaves, small-to-medium canopy and round-to-oval shape are more tolerant to pollution. The scientists reasoned that as compared to simple leaves, compound leaves are less exposed to air pollutants making trees bearing such leaves more tolerant.

“Identification of relative tolerance of tree species to air pollutants with respect to their leaf functional traits and canopy characteristics could be useful in planning green belt development in cities. Our findings are also useful for urban biodiversity conservation, which will enhance ecosystem services by supporting biodiversity, improving aesthetic appearance and mitigating air pollutant’s burden to reduce human health risk,” said Dr Madhoolika Agarwal, author of the study, while speaking to [India Science Wire](#).

The results of the study have been published in journal *Ecotoxicology and Environmental Safety*. The research team included Arideep Mukherjee and Madhoolika Agrawal from the Banaras Hindu University.

(India Science Wire)

An air cleaner with potential

Dinesh C. Sharma



IIT researchers develop a composite material that could help tackle pollution

A team of scientists led by researchers at the Indian Institute of Technology (IIT) Gandhinagar, Gujarat, has developed a nanocomposite material that can selectively convert environmental carbon monoxide into less toxic carbon dioxide. Carbon monoxide (CO) is a major air pollutant that poses a serious threat to health.

The new composite material is made of graphene and an alloy of platinum and palladium in the form of nanoparticles. In the project, graphene was used as a substrate and then “decorated” with alloy nanoparticles made of platinum and palladium. The novel catalytic structure was then used for selective oxidation of CO into CO₂. The use of a metal particle of certain orientation which absorbs or interacts with CO at lower energy helped the conversion.

“Once integrated, it is the size and shape of the nanoparticles that control the catalytic efficiency of the hybrid material. The efficiency of any catalyst depends on the availability of active sites

and the surface area of nanoparticles. Therefore, engineering the morphology of alloy nanoparticles and their integration with graphene is critical to achieve catalytic performance,” said Dr. Chandra Sekhar Tiwary, a member of the research team at IIT Gandhinagar.

“While platinum and palladium, on their own, are active catalysts, alloying them with graphene does wonders. The hybrid has shown high adsorption and reaction due to synergism among the three,” Prof. Sudhanshu Sharma, also from IIT Gandhinagar, said.

The catalytic behaviour of the nanocomposite was studied using different morphologies for the oxidation of CO. The conversion rate varied along with the flow rate of CO as well as temperature, showing full conversion at temperatures ranging from 75° to 125°.

“These are initial results which are exciting. We are trying to build 3D porous architecture using such a hybrid for practical applications and at room temperature,” Dr. Tiwary said.

Potential applications

The new material could find potential use in chemical industries as well as environmental cleaning, the researchers said.

However, experts sound a note of caution.

“While the concept used is novel and important as CO is a major environmental problem, it may take a while for this science to be converted into technology because the experimental set-up appears complex and may not be commercially viable,” said Dr. Ramavatar Meena, a scientist at the Central Salt and Marine Chemicals Research Institute, Bhavnagar, Gujarat, who is not connected with the present study.

The study was done in collaboration with scientists from IIT Kanpur and the University of Campinas, Brazil. The team included S. Sreehala, R.S. Kumar Mishra, Sudhanshu Sharma and C.S. Tiwary (all from IIT Gandhinagar); M. Manolata Devi, N. Dolai, Krishanu Biswas (from IIT Kanpur); and Y.M. Jaques and Douglas S. Galvao (from the University of Campinas). The results have been published in *Nanoscale*, the journal of the Royal Society of Chemistry.

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— India Science Wire



EASTERN MIRROR

Judicious Use of Bioinsecticide may Help Control Filariasis Vector

May 25, 2018 / Comments Off on Judicious Use of Bioinsecticide may Help Control Filariasis Vector

By Monika Kundu Srivastava | India Science Wire

Filariasis is a public health problem in some parts of the country. It is caused by parasitic worms which get deposited on skin and penetrate on their own or through openings created by mosquito bites to reach the lymphatic system. Effective mosquito control can help control filariasis.

Researchers have now found that using a commercially available bioinsecticide – spinosad – in right doses can help control *Culexquinquefasciatus* mosquitoes that spread filariasis. Spinosad is a biolarvicide that is naturally produced and acts by killing the larvae of insects. It works by overexciting the nervous system of target insect or their larvae.

Two preparations of spinosad were selected and used in various breeding areas of the *Culex* mosquito such as cesspits, drains and abandoned wells in Cuddalore in Tamil Nadu where filariasis is widespread. The 20 per cent emulsified concentrate preparation was found to be more effective than 12 per cent suspension concentrate in providing protection. The emulsified concentrate caused 90 to 100 per cent reduction of mosquito larvae in 7-14 days in cesspits, 10-17 days in drains and 14-30 days in abandoned wells, according to results published recently in Indian Journal of Medical Research. Spinosad was also more effective than chemical insecticides.

The study was conducted by researchers at the Vector Control Research Centre of Indian Council of Medical Research (ICMR) in Puducherry, as part of WHO Pesticide Evaluation Scheme (WHOPES).

Though the cost of spinosad-based preparations is higher compared to chemical insecticides, they remain effective for a longer time, thereby reducing the frequency of application. This compensates the higher cost by minimizing operational cost. “Due to their unique action,

spinosads can be used in rotation for various insect resistant management programmes and also as a part of integrated vector management wherein resources have to be utilized optimally,” the research paper said.

“These findings are important because there are far too many preparations of spinosad available in the market but there is no data on their effectiveness. Even though there are other good chemical insecticides and biolarvicides, most of them do not have a long-term effect. Spinosad is effective and no insect has yet developed a resistance to it,” observed DrKamarajuRaghavendra from National Institute of Malaria Research, New Delhi, who was not connected with the study.

Anti Diabetic Elements Found In Lemon Ancestral Fruit Grapefruit In Recent Research By Indian Scientist Ta | नींबू-वंशीय फल चकोतरा में मिले मधुमेह-रोधी तत्व



May 26, 2018

भारतीय वैज्ञानिकों द्वारा किए गए एक ताजा शोध में नींबू-वंशीय फल चकोतरा में नरिंगिन नामक तत्व की पहचान की गई है, जो रक्त में उच्च ग्लूकोज स्तर (हाई ब्लड शुगर) के लिए जिम्मेदार एंजाइम को नियंत्रित करने में उपयोगी हो सकता है. इस अध्ययन से जुड़े वैज्ञानिकों के अनुसार, चकोतरा फल के उपयोग से कई तरह के फूड फॉर्मूलेशन विकसित किए जा सकते हैं, जो मधुमेह रोगियों के लिए खासतौर पर लाभकारी हो सकते हैं.

मैसूर स्थित केंद्रीय खाद्य प्रौद्योगिकी अनुसंधान संस्थान (सीएफटीआरआई) के वैज्ञानिकों द्वारा किए गए इस अध्ययन के दौरान खास वैज्ञानिक विधियों से चकोतरा फल के विभिन्न भागों के अर्क को अलग किया गया

और फिर विभिन्न परीक्षणों के जरिए उनमें मौजूद गुणों का पता लगाया गया है. इस अध्ययन के नतीजे शोध पत्रिका करेंट साइंस के ताजा अंक में प्रकाशित किए गए हैं.

मधुमेह रोकने में कारगर है चकोतरा

मधुमेह के शुरुआती चरण में मरीजों के उपचार के लिए भोजन के बाद हाई ब्लड शुगर को नियंत्रित करना चिकित्सीय रणनीति का एक प्रमुख हिस्सा है. इसके लिए कार्बोहाइड्रेट के जलीय अपघटन के लिए जिम्मेदार एंजाइमों को बाधित करने की रणनीति अपनाई जाती है. रक्त में ग्लूकोज के बढ़ते स्तर को धीमा करने के लिए इन एंजाइमों के अवरोधकों का उपयोग किया जाता है. नरिंगिन जैविक रूप से सक्रिय एक ऐसा ही एंजाइम है, जो कार्बोहाइड्रेट के जलीय अपघटन से जुड़ी गतिविधियों के अवरोधक के तौर पर काम करता है.

सीएफटीआरआई से जुड़ी प्रमुख शोधकर्ता डॉ एमएन शशिरेखा ने इंडिया साइंस वायर को बताया कि 'नरिंगिन के अलावा, चकोतरा में पाए गए अन्य तत्व भी लाभकारी हो सकते हैं. चकोतरा का स्वाद कुछ ऐसा होता है कि इसे सीधा खाना कठिन होता है. सूखे हुए चकोतरा का पांच ग्राम पाउडर 200 ग्राम चपाती में मिलाकर करें तो यह मधुमेह रोगियों के लिए उपयोगी हो सकता है. बेकरी उत्पादों में भी इसके पाउडर का उपयोग किया जा सकता है. चकोतरा के स्वास्थ्य संबंधी फायदों को देखते हुए इसके उत्पादन और इस फल से बनने खाद्य उत्पादों को बढ़ावा दिए जाने की जरूरत है.'

चकोतरा भारत और दक्षिण-पूर्वी एशिया मूल का नींबू-वंशीय फल

पारंपरिक एवं हर्बल चिकित्सा पद्धति में नींबू-वंशीय फलों की व्याख्या मधुमेह-रोधी दवाओं के स्रोत के रूप में की गई है, जिसमें चकोतरा भी शामिल है. रूटेसी पादप समूह से जुड़ा चकोतरा भारतीय उपमहाद्वीप और दक्षिण-पूर्वी एशिया मूल का नींबू-वंशीय फल है. पूरी तरह विकसित होने पर इसके फल का वजन एक से दो किलोग्राम होता है. हालांकि, संतरा, मौसमी, नारंगी और नींबू जैसे दूसरे नींबू-वंशीय फलों के वैश्विक उत्पादन के मुकाबले चकोतरा का उत्पादन सबसे कम होता है.

मधुमेह की सिंथेटिक दवाओं के संभावित दुष्प्रभावों के कारण कई बार हर्बल दवाओं के उपयोग की सलाह दी जाती है. चकोतरा जैसे फलों में मधुमेह-रोधी तत्वों की खोज उसी से प्रेरित है. चकोतरा में एंटी-ऑक्सीडेंट, एंटी-इन्फ्लेमेटरी, ट्यूमर-रोधी, मधुमेह-रोधी और मोटापा-रोधी गुण पाए जाते हैं. पुराने साहित्य में भी चकोतरा के गुणों की व्याख्या भूख बढ़ाने वाले पेट के टॉनिक, बुखार, अनिद्रा, गले के संक्रमण तथा हृदय के लिए उपयोगी फल के रूप में की गई है. अध्ययनकर्ताओं में डॉ शशिरेखा अलावा एसके रेशमी, एचके मनोनमनी और जेआर मंजूनाथ शामिल थे.

(इंडिया साइंस वायर)



Artificial Membrane Inspired By Fish Scales May Help In Cleaning Oil Spills

May 28, 2018 By [Ratneshwar Thakur](#) Twitter handle: @ratnesh_thakur

New Delhi, May 28 (India Science Wire): Fishscales have a typical structure and chemistry that makes them naturally capable of repelling oil. Scientists are trying to exploit this property for developing novel materials that can find application in addressing oil pollution. The objective is to synthesize artificial interfaces that have oil repelling property or underwater superoleophobicity. In this direction, a group of researchers at the Indian Institute of Technology (IIT), Guwahati, have developed a stretchable underwater superoleophobic membrane that can separate water from various forms of oil-contaminations.

The membrane can work in complex scenarios including extreme pH and temperatures, surfactant-contaminated water, river water, and seawater. It is able to separate oil repetitively from water even after 1,000 cycles of physical deformations.

The material has been designed by depositing a polymeric nano-complex on a polyurethane based stretchable fibrous substrate. The polymeric nano-complex was prepared by mixing a branched polyethylene polymer with Penta-acrylate molecules. The polymeric nano-complex coated fibrous substrate was then modified with glucaminemolecules to mimic the fish-scale wettability, explained Dr. Uttam Manna, leader of the research team while speaking to *India Science Wire*.

Dibyanga Parbat, co-researcher, said the new material could help in taking care of wastewater discharge from refineries and other oil-based industrial units and accidental oil spills. In addition, it could also have biomedical applications. For instance, it could be used as an anti-biofouling coating on substrates such as catheter balloon.

The existing general approaches for the synthesis of fish-scale mimicked interfaces are mostly based on depositions of polymeric hydrogels and metal oxides both of which are not durable in severe conditions.

“This work can find immense applications, and potentially create economic value,” commented, Dr. Thalappil Pradeep, Professor of Chemistry, from Indian Institute of Technology Madras, who was not connected with the study.

This study was financially supported by Science and Engineering Research Board (SERB), Department of Science and Technology. The results of this study have been published in *Journal of Materials Chemistry A*.

(India Science Wire)

TECH ②

Scientists at BITS develop a microneedle-based system that can take away the pain from vaccinations

Yogesh Sharma May 28, 2018 17:48 PM IST

For kids who hate needle pricks, there may be another option in the offing.



Scientists at Hyderabad campus of [Birla Institute of Technology and Science](#) (BITS) Pilani have developed a microneedle patch for **drug delivery** using a biopolymer, zein. Zein is actually a protein found in corn and has been used in the manufacture of biodegradable plastics, fibers, adhesives, coatings, inks, cosmetics, textiles, and chewing gum, and is considered safe for pharmaceutical applications.

The new device, according to the researchers, would result in improved stability of antigen after coating on to zein microneedles. The research team used micro molding, a fabrication technique used for replicating microstructures to cast cone-shaped zein microneedles.

Microneedles, unlike a syringe needle, does not cause much of an injury as they need a minimal invasion of the skin.

Vaccines are usually inactive or weakened antigens which cannot cause infection but induce immune response by producing antibodies. For immunization, a model antigen Ovalbumin was loaded on zein microneedles and it was inserted into the skin of a mouse. Later researchers examined the tissues samples and found a significant antibody response against the antigen.

Microneedle patch technology could offer economic and manufacturing advantages. Such a patch can reduce the cost of vaccination since self-administration can eliminate the need of health workers for vaccination. The new patch has been found stable after storage under ambient and refrigerator conditions and can be easily packaged for transportation.

“We have designed more studies in order to confirm if the requirement of cold storage for vaccine products could be avoided, even while we can significantly improve the people perception about taking painful vaccine injections,” Venkata Vamsi Krishna, team leader, told *India Science Wire*.

Researchers expect their work could result in the development of new mechanisms to address significant problems associated with drug delivery including cancer targeting. Recently the team has tested the microneedle system for the delivery of a chemotherapeutic agent to treat breast cancer. The focus of this study published in *AAPS PharmSciTech Journal* was to examine the impact of physicochemical properties of chemotherapeutic agents in their loading, release behaviour, and skin permeation using microneedles.

“We are currently performing in-vivo animal testing of microneedle devices for their potential to effectively administer a combination of drugs into breast tumor with minimal invasion. Only after the results from animal testing which could take 4-5 months, we could present microneedle devices as an important alternative to currently used injectable formulations” said Vamsi.

The research group is currently focused on improving localized delivery of therapeutics, while administering drugs through the skin or corneal membrane. Their broader goal is to find ways and develop suitable mechanisms and devices to limit the exposures of therapeutics to unwanted sites and limit them to disease specific site.

The research team included Venkata Vamsi Krishna Venuganti, Shubhmita Bhatnagar, Sumeet Rajesh Chawla, Onkar Prakash Kulkari, Pooja Kumari and Srijanaki Paravastu Pattarabhiran. The work funded by BITS Pilani and the Department of Science and Technology (DST) under its Fund for Improvement of S&T Infrastructure (FIST).

India Science Wire

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INDIAN SCIENTISTS DEVELOP BUILDING BLOCK OF OPTICAL COMPUTING

Arvind Gupta Wednesday, 30 May, 2018 Highlights, टेक्नोलॉजी Leave a comment 79 Views

By Dinesh C. Sharma

Newswave @ New Delhi

In a development that could boost optical or light-based computing, a group of Indian scientists has developed a photodetector device by integrating sheets of nanomaterials with silicon. The device could be used to develop a switch for optical computing and could also make silicon solar cells more efficient.

Computers, at present, use electronic circuits consisting of transistors – tiny devices which act like an on/off switch for streams of electrons. This is called binary switching. In the same way, optical computing works on switches that get activated with light or beams of photons. Developing a photodetector that works with a wide range of light has engaged scientists in recent years.

Developed a multifunctional photodetector



Scientists at the CSIR-National Physical Laboratory (NPL) in New Delhi have now developed a photodetector that can operate over a broadband range of light (250 to 1650 nanometers) and displays binary photoswitching behaviour over a similar range 250 to 1350 nanometers. Such high-performance level for a multifunctional photodetector has been achieved for the first time, researchers have claimed in their study published in journal *Advanced Optical Materials*.

At the core of the photodetector is a new class of semiconducting material called graphitic carbon-nitride. Scientists at NPL integrated ultrathin nanosheets of graphitic carbon-nitride with silicon. Though graphitic carbon-nitride is projected as next generation material for energy harvesting devices, storage, photocatalyst and optoelectronic applications, its full understanding and its integration with silicon is in its infancy.

Low-cost technique

“We have tried to overcome this bottleneck by ultra-thinning graphitic carbon-nitride using a versatile and low-cost technique of ultrasonic exfoliation. The ultrathin graphitic carbon-nitride was then integrated with surface modified silicon substrate via two stage etching process,” explained Dr Prabir Pal and Dr Suraj P. Khanna, who jointly led the research team.

The process involved using ultrasonication to achieve critical structural rearrangement with a high degree of exfoliation in graphitic carbon-nitride nanosheets. This enhanced light absorption capabilities of the material, added Dr Surinder P. Singh and Dr H. K. Singh, members of the research team.

“The seamless integration of graphitic carbon-nitride with silicon means it can also be utilized for enhancing the performance of existing energy harvesting devices,” said Dr Khanna.

The research team included Nisha Prakash, Gaurav Kumar, Manjri Singh, Arun Barvat, Prabir Pal, Surinder P. Singh, H. K. Singh, and Suraj P. Khanna. The research work was supported by NPL, UGC and DST Start-Up Research Grant (Young Scientists) of Science and Engineering Research Board (SERB). (India Science Wire)

New way found to enhance strength and ductility of high entropy alloys

SUNDERARAJAN PADMANABHANT+ T-

NEW DELHI, MAY 29

A joint team of researchers from India, Japan and Sweden have found a way to make multiphase high entropy alloys (HEAs), which are a recently emerging class of alloys, simultaneously stronger and more ductile.

In a study published in journal, Scientific Reports, the researchers have reported that novel heterogeneous microstructure achieved by a process of cryo-deformation followed by annealing can help overcome the problem of strength-ductility trade-off in multiphase HEAs. The researchers are from Indian Institute of Technology, Hyderabad, Kyoto University, Japan and Chalmers University, Sweden.

Conventionally, alloys are based on one major element to which other alloying elements are added in small quantities to achieve the desired properties. In 2004, Professor J.W. Yeh of National Tsing Hua University, Taiwan proposed that it should be possible to develop a massive number of alloys using five or more components with equiatomic or near-equiatomic concentrations. These novel alloys have come to be known as high entropy alloys (HEAs) due to their large configurational entropy. HEAs, however, suffer from the issue of strength-ductility trade-off as conventional alloys. It means strength can be enhanced only at the cost of ductility.

The new research could help address this issue. Speaking to India Science Wire, Dr. Pinaki Prasad Bhattacharjee of IIT Hyderabad said that both strength and ductility could be enhanced simultaneously by subjecting the alloy to cryo-deformation followed by annealing.

This, he said, should help use HEAs for more diverse applications than hitherto thought possible.

“Increasing strength of materials is beneficial for reducing the cross-sectional area of engineering components, which should lead to significant weight and material savings with immense economic and environmental benefits. Such strong yet ductile alloys could be of importance in transportation, space, energy, defence and security areas,” he explained.

Commenting on the work, Prof. B.S.Murty of IIT Madras, who was not part of the study team, said, “though this process of cryo-rolling and annealing has been demonstrated to improve properties of different alloys before, it is for the first time that it has been applied to HEAs”.

Besides Dr. Bhattacharjee, the team included I.S.Wani, T.Bhattacharjee (IIT Hyderabad); N.Tsuji of Kyoto University (Japan), S.Sheikh and S.Guo of Chalmers University of Technology (Sweden), and I. T.Clark, and T.Okawa, of Scienta Omicron Inc. (Japan).

(India Science Wire)

Twitter handle: [@ndpsr](#)

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दैनिक जागरण

30-05-2018

तलाशा विकल्प

नई दिल्ली स्थित भारतीय कृषि अनुसंधान संस्थान के वैज्ञानिकों ने किया तैयार, भंडारण की क्षमता और व्यवस्था सुधारने में मिलेगी मदद, किसानों को भी होगा लाभ

वैज्ञानिकों ने बनाया चलता-फिरता सौर कोल्ड स्टोरेज

वास्को-दि-गामा (गोवा), आइएसडब्ल्यू : भंडारण के अभाव में बड़ी मात्रा में सब्जियां और फल समय से पहले खराब हो जाते हैं। नई दिल्ली स्थित भारतीय कृषि अनुसंधान संस्थान के कृषि इंजीनियरिंग विभाग के वैज्ञानिकों ने सौर ऊर्जा से संचालित मोबाइल कोल्ड स्टोरेज यूनिट बनाई है, जो फल तथा सब्जियों को नष्ट होने से बचाने में मददगार हो सकती है।

न्यूनतम लागत पर फलों और सब्जियों के लंबे समय तक भंडारण के लिए बनाए गए इस कोल्ड स्टोरेज की भंडारण क्षमता 4.85 घनमीटर है। इसमें 1,000 किलोग्राम फल तथा सब्जियों का भंडारण किया जा सकता है। इसकी लंबाई 1.83 मीटर, चौड़ाई 1.34 मीटर और ऊंचाई 1.98 मीटर है। इसे गैल्वनीकृत लोहे, पॉली-कार्बोनेट और फ्लाइंगुड की चादरों और ग्लास-वूल से बनाया गया है। इस कोल्ड-स्टोरेज में 40 क्रेट्स हैं और प्रत्येक क्रेट में 25 किलोग्राम फल और सब्जियां रखे जा सकते हैं। इस कोल्ड स्टोरेज पर किए गए अनुसंधान के नतीजे शोध पत्रिका करंट साइंस में प्रकाशित किए गए हैं।

इस कोल्ड स्टोरेज में लगे पहियों द्वारा इसे एक स्थान से दूसरे स्थान पर आसानी से ले जाया जा सकता है। इसमें सौर ऊर्जा चालित 0.8 टन का एक एयरकंडीशनर लगाया गया है, जिससे कोल्ड स्टोरेज



के भीतर का तापमान 9.5 से 11 डिग्री सेल्सियस और आर्द्रता 73 से 92 प्रतिशत तक बनी रहती है। यह एयरकंडीशनर एक सौर फोटोवोल्टिक सिस्टम द्वारा चलाया जाता है। इस सिस्टम को कुल आठ सौर पैनलों, एक सौर इनवर्टर और चार बैटरियों वाले एक बैटरी-बैंक को मिलाकर बनाया गया है। इसे इस तरह तैयार किया गया है, जिससे दिन में अधिक से अधिक सौर ऊर्जा का उपयोग किया जा सके।

इस कोल्ड स्टोरेज को विकसित करने वाले वैज्ञानिक डॉ. पीके शर्मा ने बताया कि सौर ऊर्जा से चलने वाले इस नए कोल्ड स्टोरेज से बिजली की समस्या से जूझ रहे किसानों को सबसे अधिक राहत मिल सकती है। बिजली की बचत के साथ-साथ इससे कृषि उत्पादों के खराब होने की समस्या दूर होगी। कोल्ड स्टोरेज के भीतर निम्न तापमान और

उच्च सापेक्ष आर्द्रता के कारण टमाटर जैसे उत्पादों को 20 दिन तक ताजा बनाए रखा जा सकता है। इसके अलावा अन्य सब्जियों और फलों, जैसे पालक, शिमला मिर्च, ककड़ी, लौकी और पपीते को भी 20 दिनों तक सुरक्षित रख सकते हैं। डॉ. शर्मा के अनुसार, सौर संचालित शीत कोल्ड स्टोरेज का निर्माण भारत में अभी प्रयोगात्मक चरण में है। फिलहाल उपलब्ध शीत भंडारण ज्यादातर सुविधाएं बिजली चालित हैं। इनका उपयोग एक निश्चित तापमान पर सीमित उत्पादों जैसे आलू, संतरा, सेब, अंगूर, अनार, फूलों आदि के भंडारण के लिए ही हो पाता है। इससे फलों व सब्जियों की गुणवत्ता, ताजगी और जीवन अवधि बनाए रखने में मदद मिलेगी। किसानों और छोटे सब्जी तथा फल-विक्रेताओं की आवृत्ति बढ़ेगी। भारत विश्व में फल और सब्जियों का दूसरा सबसे बड़ा उत्पादक देश है, लेकिन पर्याप्त शीत भंडारण सुविधाएं नहीं होने से 30 से 35 प्रतिशत फल और सब्जियां लोगों तक पहुंचने से पहले ही खराब हो जाती हैं। किसानों को फलों और सब्जियों को तुरंत बाजार ले जाकर बेचने और गुणवत्ता खराब होने का निर्मित दबाव बना रहता है। इस नए कोल्ड स्टोरेज के उपयोग से किसान उत्तम गुणवत्ता की भंडारण सुविधाओं का लाभ छोटे स्तर पर अपनी आवश्यकतानुसार उठा सकेंगे।

was arginine, which inhibits amyloid fibril formation by inducing a large change in the shape of the native protein.

The study has shown it is possible to monitor early events of the aggregation pathway when the native protein fluctuates in its monomeric states or when it forms early oligomeric molecules by using a combination of conventional methods and spectroscopy at the single molecule level.

“We have shown that it is possible to monitor and understand the early events in aggregation. It gives us hope that a therapeutic molecule may be possible against early oligomeric molecules,” Dr. Krishnananda Chattopadhyay, leader of the research team, told *India Science Wire*.

“The study establishes that glutamate acts as a facilitator and arginine acts as an inhibitor of the late stage of alpha synuclein aggregation. However, it is not clear if the observed effect is because of other cellular changes due to the addition of these molecules or direct interaction of these molecules with alpha-synuclein. The mechanism of internalization and interaction of these molecules with alpha-synuclein needs to be better understood. It will also be challenging how one can transform this knowledge for drug development for a complex disease like Parkinson’s”, commented Dr. Samir K. Maji of IIT Bombay, who was not connected with the study.

Besides Dr. Chattopadhyay, his colleagues Sumantha Ghosh and Amrita Kundu, were involved in the study. The research results have been published in journal *Scientific Reports*. The work was funded by the Department of Science and Technology (DST).

(India Science Wire)

DownToEarth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT,
ENVIRONMENT AND HEALTH

Look beyond protected areas for conservation of endangered hangul in Kashmir: study

S Suresh Ramanan Wednesday 30 May 2018

The Kashmir red deer is the only surviving sub-species of red deer in the Indian sub-continent



The research team. Credit: author

For long-term conservation of the critically endangered red deer or hangul in Kashmir, it is necessary to take up conservation efforts beyond protected areas, a new study has suggested.

The state of Jammu and Kashmir has only about 200 hanguls in the wild. Systematic efforts are underway to conserve them at Dachigam National park on the outskirts of Srinagar. However, continuous inbreeding and geographic isolation have reduced their genetic diversity and any natural calamity or disease outbreak can cause local extinction of this species, the **study published in journal *Current Science*** has warned.

Known for its giant antlers bearing 11 to 16 points, the hangul is the state animal of Jammu and Kashmir. Globally, red deer is one of the most widespread deer species in the world. Yet several red deer species have gone locally extinct or are severely threatened. The Kashmir red deer is the only surviving sub-species of red deer in the Indian sub-continent. It has been classified as critically endangered by the International Union for Conservation of Nature (IUCN).

A team of scientists from the Wildlife Institute of India, Wildlife Trust of India and Department of Wildlife protection under the state government came together and carried out a preliminary survey during 2008-2012 in 33 sites in different valleys to assess the possibility of expanding the area for conservation for the deer.

The study sought to figure out whether there were subpopulations of the animals outside the national park and if there were any whether the area where they were found were suitable for recolonisation and whether they could be inter-connected with the national park. Researchers used open source software, Biomapper, coupled with remote sensing data extracted using ArcGIS for evaluating habitat suitability. Both direct and indirect sighting data along natural trails and paths were used to carry out habitat suitability modelling.

The scientists found that three areas, measuring about 935.46 sq. km, around Dachigam National Park, have greater potential for supporting hangul population. “Our results show year-round presence of hangul in both Wanghat–Naranag and Chandaji (spanning 292 sq km) suggesting their high potential to increase further, given adequate conservation attention and legal protection, especially in lower altitude areas which serve as important wintering and fawning grounds,” the study has said.

“Hangul needs a multi-pronged strategy. For instance, the upland pastures that are so important for the species during summer have been run over by the nomadic tribe of Bakerwal and these area needs to be reclaimed and made inviolate if hangul numbers are to grow. In addition, other areas which were once inhabited must also be given a chance. Conservation breeding programme needs to be initiated soon before the numbers become too low,” Rahul Kaul of Wildlife Trust of India and a member of the research team, explained while speaking to *India Science Wire*.

The research team included Kaul, Mayukh Chatterjee, Smita Bodhankar, Riyaz Ahmad, Mansoor Nabi Sofi (Wildlife Trust of India); Tapajit Bhattacharya (Wildlife Institute of India) and Samina Amin Charoo of Department of Wildlife Protection. (**India Science Wire**)

संयुक्त पत्ती वाले पतझड़ी पेड़ों में प्रदूषण झेलने की क्षमता सबसे अधिक

By डॉ. अदिति जैन | Publish Date: May 31 2018 4:17PM



नई दिल्ली, (इंडिया साइंस वायर): प्रदूषण से सिर्फ इन्सान प्रभावित नहीं होते, बल्कि इसका असर पेड़ों की सेहत पर भी पड़ रहा है। भारतीय वैज्ञानिकों द्वारा किए गए एक ताजा अध्ययन में यह बात सामने आयी है। बनारस हिंदू विश्वविद्यालय (बीएचयू) के शोधकर्ताओं द्वारा किए गए इस अध्ययन में पेड़ों की सेहत पर प्रदूषण के कारण पड़ने वाले प्रभाव की व्याख्या की गई है और ऐसे वृक्षों की पहचान की गई है, जो अत्यधिक वायु प्रदूषण के दबाव को झेलने की क्षमता रखते हैं।

वैज्ञानिकों के अनुसार, निरंतर बढ़ते प्रदूषण के कारण पेड़-पौधों की ऐसी प्रजातियों की पहचान जरूरी है, जो पर्यावरणीय प्रदूषण के प्रति अधिक प्रतिरोधक क्षमता रखते हैं। शहरों में हरित क्षेत्र की रूपरेखा तैयार करते समय इस तथ्य का खासतौर पर ध्यान रखना चाहिए। यह अध्ययन इस संदर्भ में काफी उपयोगी साबित हो सकता है।

दो वर्षों को दौरान लगातार छह विभिन्न ऋतुओं में यह अध्ययन किया गया है। अध्ययन के लिए वाराणसी के तीन अलग-अलग प्रदूषण स्तर वाले क्षेत्रों को चुना गया था। इसमें रिहायशी, औद्योगिक और ट्रैफिक वाले क्षेत्र शामिल थे। अध्ययनकर्ताओं ने पाया कि रिहायशी क्षेत्रों की अपेक्षा ट्रैफिक वाले तथा औद्योगिक इलाकों में कुल निलंबित सूक्ष्म कण, पार्टिकुलेट मैटर-10, नाइट्रस ऑक्साइड, सल्फर डाईऑक्साइड एवं ओजोन जैसे प्रदूषकों का स्तर ढाई गुना तक अधिक था। बरसात और गर्मियों के बाद सर्दी के मौसम में ओजोन को छोड़कर अन्य प्रदूषकों का स्तर सबसे अधिक दर्ज किया गया है। ओजोन का स्तर गर्मी के मौसम में उच्च स्तर पर था।

शोध के दौरान तीनों अध्ययन क्षेत्रों में मौजूद वृक्षों की तरह प्रजातियों को चुना गया था और फिर उन पर प्रदूषण के असर का अध्ययन किया गया। एंटी-ऑक्सीडेंट, पत्तियों में मौजूद जल और फोटो-सिंथेटिक पिगमेंट समेत पत्तियों से जुड़े करीब 15 मापदंडों को अध्ययन में शामिल किया गया था। इसके अलावा शोध क्षेत्रों में मौजूद वृक्षों की विशेषताओं का भी अध्ययन किया गया है।

अध्ययनकर्ताओं ने पाया कि हवा में तैरते सूक्ष्म कण और ओजोन का वृक्षों की सेहत पर सबसे अधिक असर पड़ रहा है। इन प्रदूषकों के कारण वृक्षों की विशेषताओं में विविधता दर्ज की गई है। अध्ययन में शामिल वृक्षों में पत्रंग या इंडियन रेडवुड (सेसलपिनिया सपन) को प्रदूषण के प्रति सबसे अधिक सहनशील पाया गया है।

अमरूद (सिडियम गुआजावा), शीशम (डलबर्जिया सिस्सू) और सिरस (अल्बिज़िया लेबेक) के पेड़ों में भी प्रदूषण को सहन करने की क्षमता पायी गई है। प्रदूषण के बढ़ते दबाव के बावजूद पेड़ों की इन प्रजातियों की पत्तियों में एंटी-ऑक्सीडेंट, रंगद्रव्य और जल की मात्रा अधिक पायी गई है।

वैज्ञानिकों का कहना है कि प्रदूषण को झेलने की पेड़ों की क्षमता उनकी कई विशेषताओं पर निर्भर करती है। इन विशेषताओं में कैनोपी अर्थात् पेड़ के छत्र का आकार, पत्तियों की बनावट तथा प्रकार और पेड़ों की प्रकृति शामिल है। संयुक्त पत्तियों वाले पतझड़ी पेड़, छोटे एवं मध्यम कैनोपी और गोल-से-अंडाकार पेड़ों में प्रदूषण के दुष्प्रभावों को झेलने की क्षमता अधिक पायी गई है।

वैज्ञानिकों के अनुसार, सामान्य पत्तियों की अपेक्षा संयुक्त पत्तियां हवा में मौजूद प्रदूषकों के संपर्क में सबसे कम आती हैं, जिसके कारण पेड़ अधिक समय तक इन पत्तियों को धारण करने में सक्षम होते हैं। अध्ययनकर्ताओं में शामिल डॉ. मधुलिका अग्रवाल ने इंडिया साइंस वायर को बताया कि “वृक्ष प्रजातियों की प्रदूषणकारी तत्वों से लड़ने की क्षमता का पता लग जाने से शहरों में हरित क्षेत्र के विकास में मदद मिल सकती है। इस अध्ययन के नतीजे जैव विविधता के संरक्षण, शहरों की सुंदरता में सुधार और प्रदूषकों का दबाव कम करके स्वास्थ्य से जुड़े खतरों को रोकने में भी उपयोगी हो सकते हैं।” इस अध्ययन के नतीजे शोध पत्रिका ईको-टॉक्सिलॉजी एंड एन्वायरमेंट सेफ्टी में प्रकाशित किए गए हैं। अध्ययनकर्ताओं में डॉ. मधुलिका अग्रवाल के अलावा अरिदीप मुखर्जी भी शामिल थे।

(इंडिया साइंस वायर)

भाषांतरण: उमाशंकर मिश्र









