



### AGRICULTURE

#### WHAT IS THE MASSIVE GRAIN STORAGE PLAN THE GOVT HAS UNVEILED, HOW IT WILL HELP FARMERS

India runs the world’s largest food programme under the National Food Security Act, 2013, that covers about 81 crore people. Therefore, to ensure food security of a billion plus population, a robust network of foodgrain storage facilities becomes essential.

The Union Cabinet of India recently approved the constitution of an Inter-Ministerial Committee (IMC) to facilitate the “world’s largest grain storage plan in the cooperative sector”.

##### Why does India need a grain storage plan?

India, the most populous country in the world, accounts for 18 per cent (1.4 billion) of the global population (7.9 billion). However, it accounts for only 11 per cent (160 million hectare) of the arable land (1,380 million hectare) in the world. Also, India runs the world’s largest food programme under the National Food Security Act, 2013, that covers about 81 crore people. Therefore, to ensure food security of a billion plus population, a robust network of foodgrain storage facilities becomes essential.

Source : <https://indianexpress.com/article/explained/what-is-the-massive-grain-storage-plan-the-govt-has-unveiled-how-itll-help-farmers-8663378/>

#### WHAT IS THE STATUS OF TRANSGENIC CROPS IN INDIA?

What are the different processes to regulate transgenic crops in India? Why did States like Gujarat, Maharashtra and Telangana defer the proposal to test Cry2Ai cotton? What is the next move of GEAC? How long before there is greater acceptance for testing modified crops?

Three States, Gujarat, Maharashtra and Telangana, have deferred a proposal, approved by the Centre’s Genetic Engineering Appraisal Committee (GEAC), to test a new kind of transgenic cotton seed that contains a gene, Cry2Ai, that purportedly makes cotton resistant to pink bollworm, a major pest. The conflict shows that a broad acceptance of genetically modified crops continues to be elusive.



Pink bollworm attack on BT cotton fields in Anantapur district in Andhra Pradesh. | Photo Credit: K. Murali Kumar

There is an array of crops – brinjal, tomato, maize, chickpea – in various stages of trials that employ transgenic technology. However, cotton remains the only transgenic crop that is being commercially cultivated in India.

Source : <https://www.thehindu.com/sci-tech/agriculture/explained-what-is-the-status-of-transgenic-crops-in-india/article66968448.ece>

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# AGRICULTURE

## FOODGRAINS, OILSEED HARVESTS WILL BREAK RECORDS, SAYS CENTRE

Agricultural Ministry said the country will achieve foodgrain production of 3305.34 Lakh Metric Tonnes (LMT) in the current agricultural year



Farm workers harvest wheat crop in a field, at a village on the outskirts of Gurugram. | Photo Credit: PTI

The Centre is estimating record production of rice, wheat, maize, soybean, rapeseed and mustard, and sugarcane, according to the “third advance estimates of production of major crops” released by the Union Agriculture Ministry here on May 25, this year

Union Minister of Agriculture and Farmers Welfare Narendra Singh Tomar, releasing the estimates, said the country will achieve foodgrain production of 3305.34 Lakh Metric Tonnes (LMT) in the current agricultural year. He credited farmers, the ability of researchers and the farmer-friendly policies of the Centre for Growth. The assessment of production of different crops is done based on the feedback from States.

Among foodgrains, the Centre expects cultivation of 1355.42 LMT of rice, 1127.43 LMT of wheat, 111.66 LMT of bajra, 547.48 LMT of coarse cereals and 359.13 LMT of Maize. In 2021-22, the production of rice was 1294.71 LMT and the production of wheat was 1077.42 LMT. The total foodgrain production is likely to be higher by 149.18 LMT as compared to 2021-22. The increase in rice could be 60.71 LMT and in wheat, it will be 50.01 LMT.

Source :

<https://www.thehindu.com/news/national/centre-expects-record-production-of-rice-wheat/article66893935.ece>

## WHY AREA UNDER COTTON CULTIVATION IS LIKELY TO SHRINK THIS KHARIF

Kapas is a long-duration crop harvested over 4-5 pickings. The first picking itself takes 100-120 days, with subsequent ones following every 15-20 days.



Given its long duration and being a relatively water-intensive crop, cotton needs a minimum of 5-6 irrigations, especially during the flowering, bud and boll formation stages.

Ganesh Nanote has decided to cut his cotton crop area in the coming kharif season by three acres and divert it to tur/arhar (pigeon-pea). He's ready to slash it further if the already-delayed southwest monsoon turns out less than normal.

This farmer from Nimbhora village in Maharashtra's Akola district has reasons to limit his area sown under the fibre crop to 8 acres, from 11 acres last year, while keeping the same unchanged at 11 acres for soyabean and increasing from zero to 3 acres for tur.

### Relative prices matter

The first is price: Out of the 100-odd quintals of kapas (raw un-ginned cotton) that Nanote harvested last year, he sold only 30 at Rs 7,000-7,200 per quintal this January. The balance 70 quintals is lying unsold.

“After realising up to Rs 10,500/quintal for my 2021 crop, I expected to get at least Rs 9,000. But the rates are now just Rs 7,200-7,400,” said Nimbhora. That's still more than the government's minimum support price (MSP) of Rs 6,620/quintal for medium-staple fibre kapas declared on Wednesday, but below what farmers like him had gotten used to.

Source :

<https://indianexpress.com/article/explained/explained-economics/why-area-under-cotton-cultivation-is-likely-to-shrink-this-kharif-8651334/>





# AGRICULTURE

## PEPSICO LAUNCHES CROP INTELLIGENCE MODEL FOR INDIA IN COLLABORATION WITH CROPIN

User-friendly mobile apps to provide farmers with insights on their crop health including a disease early warning system



PepsiCo Launches Crop Intelligence Model

PepsiCo India, through its brand “Lay’s”, announced a crop & plot-level predictive intelligence model to help farmers maximize potato yields coupled with quality via functional dashboards on user-friendly mobile apps. Launched in collaboration with Cropin, a leading global agri-tech company known for creating the first industry cloud for agriculture, this initiative is a part of PepsiCo’s ‘Precision Agriculture’ model for India and is being implemented as a pilot project in demo farms at Gujarat and Madhya Pradesh.

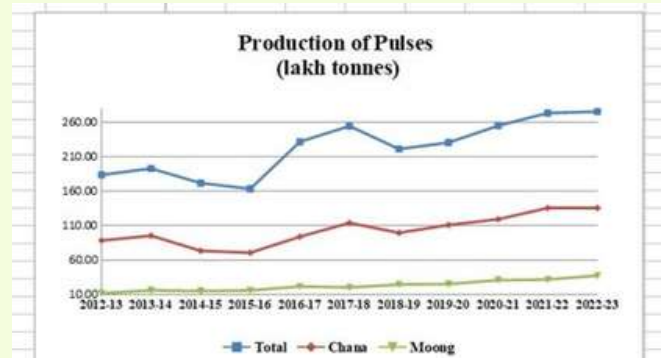
Most farmers in India own less than one hectare of farmland and face constant challenges due to lack of means to evaluate the optimum consumption of agri-inputs like water, fertilizers, and pesticides as well as actionable weather data. For example, potato yield losses caused through the blight crop disease can go up to 80% if not forecasted early. Significant yield loss caused due to ground frost is another serious issue for potato farmers especially in the northern parts of the country.

Source :

<https://indianexpress.com/article/business/sponsored-business/pepsi-co-launches-crop-intelligence-model-for-8652974-india-in-collaboration-with-cropin/>

## PULSES PRODUCTION GOES UP: THE SUCCESS STORY OF CHANA AND MOONG

What explains the significantly increased production of chickpea and green gram, when arhar/tur (pigeon-pea) and urad (black gram) have not gone up as much?



Source: Ministry of Agriculture & Farmers' Welfare

During the last 10 years, India’s production of pulses has gone up about 50%, from 18.3 million tonnes (mt) to 27.5 mt. Much of this has been from just two crops: Chana (chickpea) and moong (green gram).

Between 2012-13 and 2022-23, chana’s output has risen from 8.8 mt to 13.5 mt and the latter’s from a mere 1.2 mt to 3.7 mt (see chart). The two together now account for 62.8% of the country’s total pulses production, as against 54.6% in 2012-13 and 45.9% in 2002-03.

What explains the significantly increased production of these two pulses, and not so much of others such as arhar/tur (pigeon-pea) and urad (black gram)?

### MSP procurement factor in chana

In chana, the stimulus has come not only from a hike in its minimum support price (MSP), from Rs 3,000 per quintal in 2012-13 to Rs 5,335 in 2022-23, but also government agencies undertaking procurement at these official rates.

Chana purchases by the National Agricultural Cooperative Marketing Federation of India (NAFED) in the last 3-4 years have amounted to 2-2.5 mt, close to a fifth of the estimated output of this rabi (winter) season pulses crop.

Source :

<https://indianexpress.com/article/explained/explain-ed-economics/pulses-production-goes-up-the-success-story-of-chana-and-moong-8665097/>





## HIMALAYAN GLACIERS COULD LOSE 80% OF THEIR VOLUME IF GLOBAL WARMING ISN'T CONTROLLED, STUDY FINDS

Snow in the Hindu Kush Himalayan ranges is an important source of water for those rivers, which flow through 16 countries in Asia and provide fresh water to 240 million people in the mountains and another 1.65 billion downstream.



The Sutlej River flows in the valley below the tall snowy peaks in the Kinnaur district of the Himalayan state of Himachal Pradesh, India, March 13, 2023. (AP Photo/Ashwini Bhatia, File)

Glaciers are melting at unprecedented rates across the Hindu Kush Himalayan mountain ranges and could lose up to 80% of their volume this century if greenhouse gas emissions aren't sharply reduced, according to a report.

The report Tuesday from Kathmandu-based International Centre for Integrated Mountain Development warned that flash floods and avalanches would grow more likely in coming years, and that the availability of fresh water would be affected for nearly 2 billion people who live downstream of 12 rivers that originate in the mountains.

Snow in the Hindu Kush Himalayan ranges is an important source of water for those rivers, which flow through 16 countries in Asia and provide fresh water to 240 million people in the mountains and another 1.65 billion downstream. "The people living in these mountains who have contributed next to nothing to global warming are at high risk due to climate change," said Amina Maharjan, a migration specialist and one of the report's authors.

Source:

<https://indianexpress.com/article/technology/science/himalayan-glaciers-volume-global-warming-8675189/>

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## EL NIÑO IS HERE: NOAA FLAGS DRAMATIC WARMING IN PACIFIC OCEAN AFTER 7 YEARS, WHAT DOES THIS MEAN?

**It is important to note that El Niño has no one-on-one links India's summer monsoon. However, it is true that practically all drought years in India since Independence have witnessed El Niño events of varying intensity.**

Seven years after 2016, El Niño is back in the Pacific Ocean, the National Oceanic and Atmospheric Administration (NOAA) of the United States federal administration, announced on Thursday (June 8). Though expected, this confirmation by NOAA is of significant concern to India. Here's why.

### What is El Niño?

El Niño, which in Spanish means "little boy", is a climate pattern that develops along the equatorial Pacific Ocean after intervals of a few years ranging between 2 and 7 years.

Essentially, water on the surface of the ocean sees an unusual warming in a band straddling the equator in the central and east-central Pacific — broadly extending from the International Date line and 120°W longitude, i.e., off the Pacific coast of South America, west of the Galapagos islands.



Clouds forming in Cochin, Kerala, marking the entry of the southwestern monsoon on June 8. (Express photo by Nirmal Harindran)

Source:

<https://indianexpress.com/article/explained/explain-ed-climate/el-nino-noaa-warming-pacific-ocean-meaning-explained-8653916/>



# ENVIRONMENT

## CSE ANALYSIS SAYS SOUTH DELHI IS WORST AFFECTED BY GROUND-LEVEL OZONE

Also known as tropospheric ozone, ground-level ozone is “a colourless and highly irritating gas that forms just above the Earth's surface (up to 2 miles above the ground),” as per Environment and Climate Change Canada (ECCC).



In recent years, ground-level ozone has become a serious public health issue in India, as per CSE analysis. It quoted the 2020 State of Global Air report, which stated that age-standardised rates of death attributable to ground-level ozone is among the highest in the country. (Representational image/Express photo by Partha Paul)

According to a new analysis by the Centre for Science and Environment (CSE), parts of the Delhi-NCR region witnessed ground-level ozone readings exceeding the national standards on 87 out of 92 days in the summer period between March and May. The worst affected parts in the area are New Delhi and South Delhi neighbourhoods.

Based on Central Pollution Control Board (CPCB) data on ozone levels from 58 stations across Delhi-NCR, the CSE analysis also noted that although the spatial spread – number of stations exceeding the standard across the core NCR – of ground-level ozone has been lower this year, its duration has increased.

Source : <https://indianexpress.com/article/explained/everyday-explainers/south-delhi-and-new-delhi-worst-affected-by-ground-level-ozone-says-cse-analysis-what-is-this-pollutant-and-how-it-is-harmful-to-you-8650790/>

## PANDEMIC SHUTDOWNS LOWERED EMISSIONS BUT RESULTED IN HEIGHTENED CLIMATE WARMING: STUDY

The pandemic shutdowns led to cleaner air but also increased climate warming in the short term, according to a new study.

The lockdown and related shutdowns in South Asia during the pandemic led to reduced emissions during a short period. Curiously, while this did lead to cleaner air, new research has discovered that it also led to increased climate warming in the short term.

This is because the shutdowns barely affected the concentration of long-lived greenhouse gases in the atmosphere but they did reduce the concentration of some short-lived particles that have a cooling effect.

Emissions of sulphur oxides, nitrogen oxides and certain other pollutants can lead to the formation of aerosols in the air. These aerosols are known to have a “masking effect” on climate warming because they stay in the atmosphere and reflect some of the radiation from the Sun.



Pandemic prevention workers in protective suits walk outside a locked-down residential compound as outbreaks of the coronavirus disease (COVID-19) continue in Beijing, China November 18, 2022. (REUTERS/Thomas Peter/File Photo)

Source : <https://indianexpress.com/article/technology/science/pandemic-shutdown-climate-warming-8642704/>



# ENVIRONMENT

## CYCLONE BIPARJOY: WHAT IS A CYCLONE AND WHAT ARE ITS TYPES

The National Disaster Management Authority classifies cyclones broadly into two categories: extratropical cyclones and tropical cyclones. Here is what you need to know about them.



Dense clouds hover over the Mandvi city ahead of the landfall of Biparjoy cyclone, in Kutch district, Monday, June 12, 2023. (PTI Photo)

Developed in the Arabian Sea, cyclone Biparjoy, earlier expected to move towards the Pakistan coastline, has now changed its path and is heading towards the northern Gujarat coast with landfall expected on June 15. According to India's Regional Specialised Meteorological Centre (RSMC), the cyclone might cause storm surges of 2-3 metres in height, destruction of thatched houses, damage to pucca houses and roads, floodings, widespread damage to standing crops, plantations and orchards, and disruption of railways, powerlines and signalling systems in the northern and western coastal districts of Gujarat.

### What is a cyclone?

A cyclone is a large-scale system of air that rotates around the centre of a low-pressure area. It is usually accompanied by violent storms and bad weather. As per NDMA, a cyclone is characterised by inward spiralling winds that rotate anticlockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Source:

<https://indianexpress.com/article/explained/everyday-explainers/cyclone-biparjoy-what-is-a-cyclone-and-what-are-its-types-8659297/>

## WORLD ENVIRONMENT DAY 2023: A GLOSSARY OF TERMS TO DO WITH PLASTIC POLLUTION

This year's World Environment Day campaign #BeatPlasticPollution calls for global solutions to combat plastic pollution.



Due to the Great Pacific Garbage Patch, heaps of garbage gets swept to Hawaii's southern beaches, dirtying the otherwise pristine environment there. (Wikimedia Commons)

Since the early 20th century, plastics have become a ubiquitous part of human life, despite their many adverse impacts on the environment.

This year's World Environment Day (June 5) has the theme of #BeatPlasticPollution, calling for global solutions to combat the pandemic of plastic pollution.

### 50th anniversary of the World Environment Day

The World Environment Day, led by the United Nations Environment Programme (UNEP), has been held annually on June 5, since 1973. The date was chosen by the UN General Assembly during the historic 1972 Stockholm Conference on the Human Environment – considered to be the first world conference to make the environment a major issue.

Over the years, it has grown to become the largest global platform for environmental outreach, with millions of people from across the world engaging to protect the planet.

Source:

<https://indianexpress.com/article/explained/everyday-explainers/world-environment-day-a-glossary-plastic-pollution-8646878/>





## MORE INDIANS ARE GETTING DIABETES, BELLY FAT, CHOLESTEROL AND HIGH BP, SAYS ICMR-BACKED STUDY

The study, which was spearheaded by Dr Mohan's Diabetes Specialities Centre and based on 113,000 people from 31 states of India, maps how we are getting sicker



Published on Thursday in The Lancet Diabetes & Endocrinology, it shows that 11.4 per cent or 101 million people in India have diabetes. (File Photo: Getty Images/Thinkstock)

Are Indians becoming a sicker nation? One of the biggest and representative studies on lifestyle markers, which determine the burden of non-communicable diseases, has shown that we have a prevalence of metabolic disorders such as diabetes, hypertension, central obesity or abdominal fat and high cholesterol. Not only that. The country's diabetes burden is likely to shoot up over the next five years, especially in rural areas and states where the prevalence of diabetes is currently low. The study, which was spearheaded by Dr Mohan's Diabetes Specialities Centre with support from the Indian Council of Medical Research (ICMR), was based on 113,000 people from 31 states of India.

Published on Thursday in The Lancet Diabetes & Endocrinology, it shows that 11.4 per cent or 101 million people in India have diabetes. What is more concerning, however, is the finding that 15.3 per cent or 136 million people have prediabetes. "There is almost no rural and urban divide when it comes to the prevalence of prediabetes.

Source :  
<https://indianexpress.com/article/health-wellness/more-indians-getting-diabetes-belly-fat-cholesterol-high-bp-8653224/>

## ROCK, TABLE, OR IODISED — THE SAFEST SALT OPTION FOR HYPERTENSION PATIENTS IS...

The American Heart Association recommends limiting sodium intake to 1,500 mg a day



Rock salt may contain trace minerals and impurities, while table and iodized salt is more purified. (Pic source: Freepik)

With a variety of salts available in the market, it can be daunting to choose one over the other. Sometimes, it can be equally confusing as not all of us may know the differences between table salt, rock salt, and iodised salt. If you too struggle with these questions, we spoke to experts on your behalf who decoded how each salt is different from the other, their properties, and the things to keep in mind. Check it out below.

### What is rock salt?

Rock salt is unprocessed table salt. It is darker in colour as the impurities are higher. The minerals are reserved, as it is not processed. "Rock salt retains natural impurities and mineral content such as potassium, magnesium, calcium, etc. Its granules are large and it has a unique flavour due to these impurities," Ushikiran Sisodia, Registered Dietician and Clinical Nutritionist Diet and Nutrition, Nanavati Max Super Speciality Hospital told indianexpress.com.

### What is iodised salt?

Iodised salt is table salt mixed with a minute amount of iodine-containing compounds, providing a dietary source of iodine, a nutrient essential for proper thyroid function.

Source :  
<https://indianexpress.com/article/lifestyle/health/rock-salt-vs-table-salt-vs-iodized-salt-sodium-intake-moderation-8650656/>



# HEALTH

## WHAT IS VIRTUAL AUTISM?

Research shows that children, 0-3 years, who stared at screens for over four hours a day, had ‘sensory-motor and socio-affective deprivation’ which can impede learning processes later in life.



Image for representational purpose only. File | Photo Credit: The Hindu

Virtual autism is a phrase formulated in 2018 by Marius Teodor Zamfir, a Romanian psychologist. He found that children, 0-3 years, who stared at screens for over four hours a day, had “sensory-motor and socio-affective deprivation”. These activated “behaviors and elements are similar to those found in children diagnosed with ASD [autism spectrum disorder]”. Three areas were studied: social, language, and cognition.

The analyzed group consisted of 110 children and has piqued the interest of psychologists, teachers, and occupational therapists, who are encountering a host of behavioral changes in children now joining the school. Autism is a pervasive development disorder, meaning it affects all areas of early childhood development, including speech, sociability, play, and skill development.

Aarti Rajaratnam, a Salem-based child psychologist, says it’s not about focusing on how to keep children off screens and demonising screens, but on what is natural for infants, babies, and children. “The nervous system is not ready for screens,” she says, adding that there is no substitute for human interaction. “A parent or sibling blowing bubbles and a child reaching out to touch them is not the same the a simulated video game on a tablet.”

Source:  
<https://www.thehindu.com/sci-tech/health/what-is-virtual-autism/article66922870.ece>

## WORLD BICYCLE DAY 2023: MANY BENEFITS OF CYCLING FOR YOUR BODY AND MIND

On the occasion of World Bicycle Day (June 3), here are all the reasons why you should trust your good old bicycle for your overall well-being.



The low-impact activity can also benefit people with diabetes as it helps manage blood sugar levels, and also improve cardiovascular health, reduce blood pressure, and keep weight in check, which are risk factors for diabetes. (Unsplash)

A simple bicycle ride is not only joyful and a stressbuster but can also work wonders for health. A fun way to lose weight and manage chronic diseases, riding a bicycle can help improve your heart health and muscular strength. Studies have proved that cycling can help alleviate depression, anxiety, stress and elevates mood by releasing happy hormone. Cycling also helps keep the lower body joints healthy. The low-impact activity can also benefit people with diabetes as it helps manage blood sugar levels, and also improve cardiovascular health, reduce blood pressure, and keep weight in check, which are risk factors for diabetes. By incorporating cycling as a hobby into our life, we can multiply our joy as well as health quotient manifold. On the occasion of World Bicycle Day (June 3), motivates us why you should trust your good old bicycle for our overall well-being.

There are many ways of keeping yourself fit and maintaining a healthy lifestyle, but these days a very popular way is cycling. Cycling helps you to stay fit and is a fun activity.

Source:  
<https://www.hindustantimes.com/lifestyle/health/world-bicycle-day-many-benefits-of-cycling-for-your-body-and-mind-101685697193169.html>





# HEALTH

## NEED VITAMIN D? THE SUN DOES THE JOB, YOU DON'T NEED SUPPLEMENTS. EVEN A CLOUDY DAY IT WORKS FOR YOU

Exposure to sunlight for about 15 to 30 minutes, two to three times a week, is adequate for most individuals to maintain sufficient vitamin D levels. If that seems punishing in hot weather, stay hydrated. The body can make all the vitamin D it needs for a day in about half the time it takes the skin to burn, says Dr Tarun Sahani, Senior Consultant, Internal Medicine, Indraprastha Apollo Hospitals, New Delhi



Often, we rush to take vitamin D supplements on our own without addressing its deficiency through the easiest method, by just exposing ourselves to sunlight. Many patients of mine have benefitted by just conscious exposure, given the fact that we are mostly indoors, even while working out in a gym. Besides, supplements will have a temporary effect. Yes, and cloudy days are just as good for your daily dose to soak up the sun, you may have to stay out just a bit longer.

Sunlight exposure is an essential source of vitamin D, a crucial nutrient for maintaining healthy bones and overall well-being. India, known for its tropical climate and abundant sunshine, may seem like an unlikely setting for widespread vitamin D deficiency. However, various factors contribute to this paradoxical situation. First, the cultural norms and preferences for lighter skin tone have led to a prevalence of sun avoidance practices, such as wearing long clothing, using umbrellas or seeking shade, particularly among urban populations. These practices limit the exposure of the skin to sunlight, hindering the synthesis of vitamin D.

Source :  
<https://indianexpress.com/article/health-wellness/vitamin-d-sun-supplements-8640138/>

## WHAT HAPPENS TO THE BODY WHEN YOU GIVE UP SUGAR FOR A MONTH?

"When you completely give up sugar for a month, several changes may occur in your body," said Ankita Ghoshal Bisht, Dietician in Charge, Primus Super Speciality Hospital



Sugar is a major contributor to excess calorie intake (Source: Getty Images)

Our dependence on sugar has become a pervasive aspect of our modern lifestyle. From sweetened beverages and processed snacks to our regular sweets, sugar has crept into all aspects of our diet. However, this heavy consumption of sugar comes with detrimental health effects, including obesity, diabetes, heart disease, and other chronic health conditions. As such, it becomes crucial to be aware of the negative impact of sugar and make conscious choices to reduce our intake for our overall well-being.

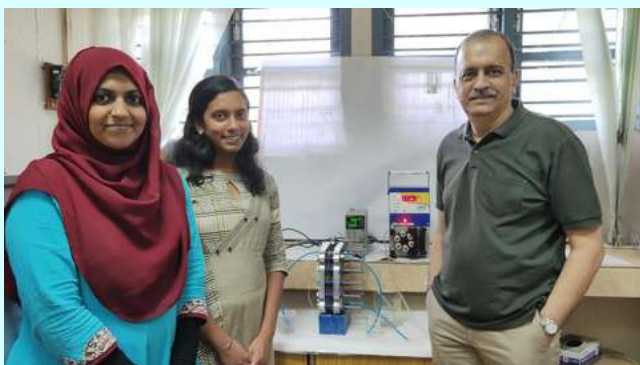
In a situation like this, should one consider eliminating sugar from their diet completely? Moreover, what changes can one expect in their body if they stay away from sugar for a month, to begin with? We reached out to experts to know more. "When you completely give up sugar for a month, following changes may occur in your body," said Ankita Ghoshal Bisht, dietician in charge, Primus Super Speciality Hospital.

\*Improved blood sugar levels: \*Weight loss:  
\*Reduced cravings: \*Improved energy levels:  
\*Better dental health: \*Potential for improved skin health:

Source :  
<https://indianexpress.com/article/lifestyle/health/giving-up-sugar-month-health-effects-8656021/>

## IIT-MADRAS GENERATES HYDROGEN FROM SEAWATER USING SOLAR ENERGY

The researchers have optimised all the parameters so that water electrolyte can directly use photovoltaic-derived voltage and current density to split water and generate hydrogen



The team of researchers at IIT-Madras behind the study

Researchers from the Department of Physics at IIT-Madras have developed critical components for a highly efficient, cost-effective way to electrolyze seawater to generate hydrogen. The results were published in the journal ACS Applied Energy Materials.

State-of-the-art alkaline water electrolyser technology is energy-intensive, requires an expensive oxide-polymer separator, and uses fresh water for electrolysis. The IIT-Madras team led by Dr. Ramaprabhu Sundara has addressed each of these challenges by developing simple, scalable and cost-effective alternatives that are highly efficient in splitting seawater and generating hydrogen.

Source:

<https://www.thehindu.com/sci-tech/science/iit-madras-generates-hydrogen-from-seawater-using-solar-energy/article66951534.ece>

## INDIAN SCIENTISTS DISCOVER NEW EXOPLANET WITH MASS 13 TIMES THAT OF JUPITER

ISRO says the discovery of this exoplanet has been made using the indigenously made PRL Advanced Radial-velocity Abu-sky Search spectrograph (PARAS) at the 1.2 m telescope of PRL at its Gurushikhar Observatory in Mt. Abu by measuring the mass of the planet precisely



An artist's concept of the TOI 4603b, a gas giant exoplanet that orbits an F-type star. Its mass is 12.89 Jupiters and it takes 7.2 days to complete one orbit of its star. Photo Credit: exoplanets.nasa.gov

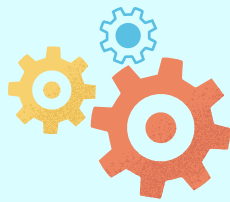
A new Jupiter-size exoplanet with the highest density known till this date and mass 13 times than that of Jupiter, has been discovered by an international team of scientists led by Prof. Abhijit Chakraborty at the Exoplanet Research Group of the Physical Research Laboratory (PRL), Ahmedabad.

An exoplanet is any planet beyond the solar system and the planet discovered by scientists from India, Germany, Switzerland and the USA is with a density of  $\sim 14 \text{ g/cm}^3$ . Massive giant exoplanets are those having mass greater than four times that of Jupiter.

### Made with indigenous tech

ISRO said that the discovery of this massive exoplanet was made using the indigenously made PRL Advanced Radial-velocity Abu-sky Search spectrograph (PARAS) at the 1.2 m telescope of PRL at its Gurushikhar Observatory in Mt. Abu by measuring the mass of the planet precisely.

Source : <https://www.thehindu.com/sci-tech/science/scientists-discover-jupiter-size-massive-exoplanet/article66912192.ece>



## IIT MADRAS RESEARCHERS DEVELOP DATA SCIENCE, IOT-BASED METHOD FOR MOBILE POLLUTION MONITORING

A data science and IoT-based method for measuring pollution on mobile devices has been developed by researchers at IIT Madras.



IIT Madras researchers develop Data Science, IoT-based method for mobile pollution monitoring

Indian Institute of Technology Madras (IIT Madras) researchers have recently developed a low-cost mobile air pollution monitoring framework in which, pollution sensors mounted on public vehicles can dynamically monitor the air quality of an extended area at high spatial and temporal resolution. Traditionally, ambient air quality is measured in monitoring stations and reported by the 'Air Quality Index' (AQI). Since these stations are at fixed locations, they only measure the air quality of a small geographic area.

Air pollution, however, is dynamic with locations just a few hundred meters away from each other exhibiting different levels of pollution. Levels can also vary at different times of the day. However, setting up more stations is not practical because of the high costs.

Towards tackling this issue, IIT Madras researchers have developed a new IoT-based mobile air pollution monitoring technology wherein low-cost air quality sensors are mounted on vehicles to gather spatiotemporal air quality data. For the cost of a single reference monitoring station, it would be possible to map an entire city at high resolution using these low-cost mobile monitoring devices.

Source:

<https://www.indiatoday.in/education-today/news/story/iit-madras-researchers-develop-data-science-iot-based-method-for-mobile-pollution-monitoring-2393314-2023-06-15>

## RESEARCHERS FIND NEW WAY TO MASS PRODUCE MICRONEEDLES



Mass production of microneedles, similar to the ones used in insulin pens for diabetics, is not easy. They are manufactured using complex procedures like photolithography, which requires time as well as cleanrooms, limiting their mass production. Now, researchers from the Indian Institute of Science (IISc) and Institute for Stem Cell Science and Regenerative Medicine (inStem) have found a novel method to produce microneedles, without the complexities.

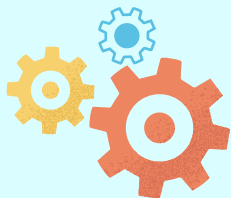
The polymeric microneedle batter (a specific polymer mix) is poured on to a platform with needle-shaped moulds which have pyramidal tips that can be adjusted to any height "As the mix solidifies, a perfectly lined-up array of hollow microneedles can be peeled off immediately, and is ready to produce the next batch right away," says an IISc statement. This eliminates the need for an expensive cleanroom, the statement adds.

The team — Vivek Ghate, Anu Renjith, Kedar Badnikar, Shreyas N Jayadevi, Manjunath M Nayak, and Dinesh Subramanyam from IISc, and, Suman Pahal and Praveen K Vemula from inStem — then tested a microneedle patch produced using this method and found that it could precisely deliver the required volume of insulin to diabetic mice in the lab.

Source:

<https://timesofindia.indiatimes.com/city/bengaluru/researchers-find-new-way-to-mass-produce-microneedles/articleshow/100979469.cms?from=mdr>





## HOW RESEARCHERS USED AI TO FIND AN ANTIBIOTIC AGAINST A SUPERBUG

Narrowing down the right antibacterial chemicals against bacteria can be a long, difficult process. This is where Artificial Intelligence can be helpful for researchers.



Antibiotics are medicines used to prevent and treat bacterial infections. Antibiotic resistance occurs when bacteria change in response to the use of these medicines. (Representational, via Pixabay)

In a major breakthrough for the use of Artificial Intelligence (AI) in the field of medicine, scientists from the United States and Canada have found a new antibiotic – powerful enough to kill a superbug – using AI.

Superbugs are bacteria that are resistant to several types of antibiotics. Each year these drug-resistant bacteria infect more than 2 million people in the US and kill at least 23,000, according to the US Centers for Disease Control and Prevention (CDC).

### What is *Acinetobacter baumannii*?

The study (“Deep learning-guided discovery of an antibiotic targeting *Acinetobacter baumannii*”) published in the journal *Nature Chemical Biology* on May 25 dealt with the bacterium *Acinetobacter baumannii* and saw participation from Canada’s McMaster University and Massachusetts Institute of Technology (MIT) in the US.

Source:

<https://indianexpress.com/article/explained/explained-sci-tech/ai-antibiotic-superbug-8645495/>

## THIS SOLAR-POWERED REACTOR CAN TURN AIR INTO FUEL, PLASTIC INTO SKINCARE INGREDIENT

Cambridge researchers have developed a solar-powered reactor that uses plastic waste to convert carbon dioxide into a useful sustainable fuel.



The lab-scale reactor can be seen here in this handout image. (Ariffin Mohamad Annuar via University of Cambridge)

Scientists at the University of Cambridge have developed a solar-powered reactor that can convert captured carbon dioxide and plastic waste into a sustainable fuel, producing some other useful chemicals in the process.

The reactor converted carbon dioxide into syngas or synthetic gas. Syngas itself is combustible and can directly be used as fuel. Some kinds of syngas were supplied to residents of many industrialised cities in the 20th century. But it is a challenging fuel to work with and is better used to create other fuels.

The plastic bottles used in the test, meanwhile, were converted into glycolic acid. Glycolic acid finds a variety of uses in the healthcare industry. It is used by people for treating acne, premature skin ageing, dark skin patches and acne scars, according to WebMD.

### Almost turning air into fuel

A particularly interesting aspect of the research, whose results were published in the peer-reviewed journal *Joule* on Monday, is that the reactors used carbon dioxide from real-world sources, including industrial exhaust and normal air.

Source:

<https://indianexpress.com/article/technology/science/solar-power-reactor-carbon-dioxide-fuel-plastic-8672828/>



# OTHERS

## GENETIC DIVERSITY DEPENDS ON SPECIES WITH LARGER BODY SIZES, MOTHER CARE: CCMB SCIENTISTS

The diversity also increases with geographical distance between individuals, indicating a limited exchange of individuals between farther sites, said the study led by Jahnvi Joshi's group.



CSIR-Centre for Cellular & Molecular Biology (CCMB) scientists, in their latest study, found that genetic diversity decreases in species with larger body sizes, and is higher for species where the mother cares for the offspring.

Using over 1,200 sequences from a maternally-inherited gene for 128 species, the study finds that genetic diversity in centipedes (a soil invertebrate group with 420 million years of evolutionary history) is higher than in other arthropods such as spiders and insects. It is found to be higher in the southern hemisphere than in the northern hemisphere.

### Geographical distance

The genetic diversity may be associated with historic climatic stability and low seasonality in southern latitudes. The diversity also increases with geographical distance between individuals, indicating a limited exchange of individuals between farther sites, said the study led by Jahnvi Joshi's group.

Source :

<https://www.thehindu.com/sci-tech/science/genetic-diversity-depends-on-species-with-larger-body-sizes-mother-care-ccmb-scientists/article66942567.ece>

## SCIENTISTS DISCOVER A VIRGIN BIRTH IN A CROCODILE

A team of researchers report that the baby crocodile was a parthenogen – the product of a virgin birth, containing only genetic material from its mother.



A photo provided by the National Park Service shows an American crocodile at Everglades National Park in Florida. (National Park Service via The New York Times)

In January 2018, a female crocodile in a Costa Rican zoo laid a clutch of eggs. That was peculiar: She'd been living alone for 16 years.

While crocodiles can lay sterile eggs that don't develop, some of this clutch looked quite normal. And one of them – in a plot twist familiar to anyone who has watched "Jurassic Park" – continued to mature in an incubator. In this case, the egg eventually yielded a perfectly formed but stillborn baby crocodile.

In a paper out Wednesday in the journal *Biology Letters*, a team of researchers report that the baby crocodile was a parthenogen – the product of a virgin birth, containing only genetic material from its mother. While parthenogenesis has been identified in creatures as diverse as king cobras, sawfish and California condors, this is the first time it has been found in crocodiles. And because of where crocodiles fall on the tree of life, it implies that pterosaurs and dinosaurs might also have been capable of such reproductive feats.

Source :

<https://indianexpress.com/article/technology/science/scientists-discover-virgin-birth-in-crocodile-8652166/>





# OTHERS

## 'MOST PAINFUL INSECT STING' FROM BULLET ANTS USES NEUROTOXINS IN A WAY NEVER SEEN BEFORE

The venom of the bullet ant and the green ant works using a neurotoxin that affects nerve cells, prolonging and intensifying pain.



The Bullet Ant's sting is one of the most painful known insect stings. (Image credit: Wikimedia commons)

The Schmidt pain index is a scale that rates the amount of pain caused by various insect bites developed by entomologist Justin O Schmidt. The most painful stings are given a rating of four on the pain index and in the original version of the index only one insect got that rating--the bullet ant.

Now, scientists have discovered that the venom of bullet ants and some other ants contain a neurotoxin that interacts with the nerve cells of the victim to prolong and intensify the pain. The research was published in an article in the journal Nature Communications last month.

"Bullet ant stings can be painful for up to 12 hours and it's a deep drilling pain you feel in your bones with sweating and goosebumps, quite unlike the 10-minute impact of a typical bee sting," said Samuel Robinson, lead author of the study, in a press statement. According to Robinson, the researchers showed that the venom of the bullet ant and the green ant target the nerve cells that send pain signals. Usually, these nerve cells usually open only for brief periods in response to a stimulus. But the study discovered that ant toxins bind to "sodium channels" and cause them to open more easily and stay open. This means that the pain signal will be long-lasting.

Source :  
<https://indianexpress.com/article/technology/science/bullet-ants-most-painful-sting-neurotoxin-8652481/>

## MOLECULAR FOSSILS OPEN WINDOW ON 'LOST WORLD' OF PRIMORDIAL LIFE

These remains, according to researchers, date to a time span during what is called the Proterozoic Eon that was crucial in the evolution of complex life but has been shrouded in mystery



Professor Jochen Brocks inspects 1.64 billion year old sediments for molecules of the Protosterol biota in Barney Creek, Northern Australia in an undated photograph. The Australian National University/Handout via REUTERS

Fossil remains of a cell membrane component identified in rocks dating back about 1.6 billion years are opening a window into what scientists are calling a "lost world" of microscopic organisms that were the primordial forerunners of Earth's fungi, algae, plants and animals – including people.

These remains, researchers said on Wednesday, 7th June 2023 to a time span during what is called the Proterozoic Eon that was crucial in the evolution of complex life but has been shrouded in mystery because of a spotty fossil record of the microscopic organisms that inhabited Earth's marine realm.

The newly identified fossils are of a rudimentary form of a steroid – a fat molecule that was an indispensable ingredient in cell membranes of pioneering members of a domain of now-dominant organisms called eukaryotes (pronounced yoo-KAR-ee-oats). Eukaryotes possess a complex cell structure including a nucleus that acts as a command and control center and subcellular structures called mitochondria that power the cell.

Source :  
<https://indianexpress.com/article/technology/science/molecular-fossils-primordial-life-8652075/>





# OTHERS

## SCIENTISTS DOCUMENT HOW SPACE TRAVEL MESSES WITH THE HUMAN BRAIN

The absence of Earth's gravity modifies the brain



The International Space Station (ISS) photographed by Expedition 56 crew members from a Soyuz spacecraft after undocking, October 4, 2018. NASA/Roscosmos/Handout via REUTERS

Space can be an unfriendly place for the human body, with microgravity conditions and other factors tampering with our physiology, from head to toe – head, of course, being a primary concern. A new NASA-funded study provides a deeper understanding of the issue. Researchers said on Thursday that astronauts who traveled on the International Space Station (ISS) or NASA space shuttles on missions lasting at least six months experienced significant expansion of the cerebral ventricles – spaces in the middle of the brain containing cerebrospinal fluid.

This colorless and watery fluid flows in and around the brain and spinal cord. It cushions the brain to help protect against sudden impact and removes waste products.

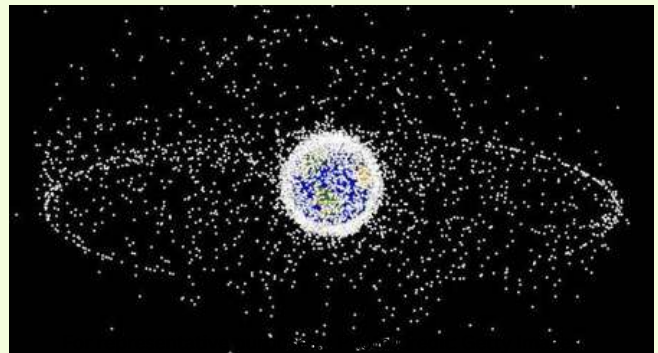
Based on brain scans of 30 astronauts, the researchers found that it took three years for the ventricles to fully recover after such journeys, suggesting that an interval of at least that duration would be advisable between longer space missions.

“If the ventricles don’t have sufficient time to recover between back-to-back missions, this may impact the brain’s ability to cope with fluid shifts in microgravity.

Source :  
<https://indianexpress.com/article/technology/science/how-space-travel-affects-the-human-brain-8654062/>

## WORLD ECONOMIC FORUM RELEASES GUIDELINES FOR TACKLING GROWING SPACE DEBRIS PROBLEM

The World Economic Forum and the European Space Agency jointly released a set of guidelines aimed at mitigating the growing space debris problem.



A computer-generated image showing the location of space debris that is currently being tracked. Note that the size of the debris has been scaled up for visibility and is not to scale with the planet. (Image credit: NASA Orbital Debris Program Office via Wikimedia)

The world has reaped the benefits of space-based technologies and applications like GPS and others. However, the increasing number of satellites in Earth’s orbit means that we also have to contend with the growing problems of orbital debris and collisions. The World Economic Forum (WEF) on Tuesday released a set of recommendations to mitigate the space debris problem.

Figures from NASA’s Orbital Debris Program Office paint a pretty grim picture of our planet’s orbit—as of January 2022, the amount of material orbiting our planet exceeded 9,000 metric tons. Of the debris in orbit, more than 25,000 objects are larger than 10 centimetres, 500,000 particles are between one and 10 centimetres in diameter and there are more than 100 million particles whose size exceeds one millimetre.

Many of these pieces of debris are flying through space at speeds many times that of a bullet. If one of the larger pieces of debris collides with an active satellite, it could sabotage what could very well be a crucial mission.

Source :  
<https://indianexpress.com/article/technology/science/world-economic-forum-space-debris-8662854/>