UPSC Daily Current Affairs| Prelim Bits 06-04-2025

2 Genome-Edited Rice Varieties Developed in India

Prelims - *Current events of national and international importance.*

Why in News?

Recently, Union Agriculture Minister released 2 genome-edited varieties of rice.

- India Becomes the *1st Country in the World* to develop genome-edited rice varieties.

  ***The genome** is the entire set of DNA instructions found in a cell. In humans, the genome consists of 23 pairs of chromosomes located in the cell's nucleus.*

- **2 genome edited rice verities**
  - DRR Rice 100 (Kamla)
  - Pusa DST Rice
- **Developed by** - Indian Council of Agricultural Research (ICAR).

  *In 2018, ICAR initiated genome-editing research to improve two major rice varieties – **Samba Mahsuri and MTU 1010**, under the National Agricultural Science Fund.*

- **Development technology** – It is by using genome-editing technology ***based on CRISPR-Cas***, which makes precise changes in the organism's genetic material without adding foreign DNA.
- Genome editing of *SDN 1 and SDN 2 types of genes* has been approved under India's biosafety regulations for general crops.

DRR Rice 100 (Kamala) variety
• Developed by - ICAR- IIRR (Indian Institute of Rice Research), Hyderabad. • Based on - Samba Mahsuri (BPT 5204). • Objective - To increase the number of grains per panicle and it matures 20 days earlier (~130 days). • Benefits – Due to its shorter duration, it helps save water and fertilizers and reduces methane gas emissions. • Its stalk is strong and does not fall. • The rice quality is similar to the original variety, Samba Mahsuri.
Pusa DST Rice 1

• Developed by - ICAR-IARI (Indian Agricultural Research Institute), New Delhi
• Based on - MTU 1010.
• Benefits – It can increase yields by 9.66% to 30.4% in saline and alkaline soils, with the potential for up to 20% increase in production.

- **Significance** – It hold the potential for revolutionary changes in higher production, climate adaptability, and water conservation.
    - A 19% increase in yield.
    - A 20% reduction in greenhouse gas emissions.
    - A saving of 7,500 million cubic meters of irrigation water.
    - Improved tolerance to drought, salinity, and climate stresses.

In the 2023-24 budget, the Government of India allocated Rs 1000 crores for genome editing in agricultural crops. ICAR has already initiated genome-editing research for several crops, including oilseeds and pulses.

Quick Facts

- **ICAR** – It is an *autonomous organisation* under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare.
- It has its *headquarters at New Delhi*.
- It is the apex body for co-ordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country.

Reference

PIB| Launch of 2 Genome Edited Rice Varieties in India

Reemergence of Vaccine Preventable Diseases

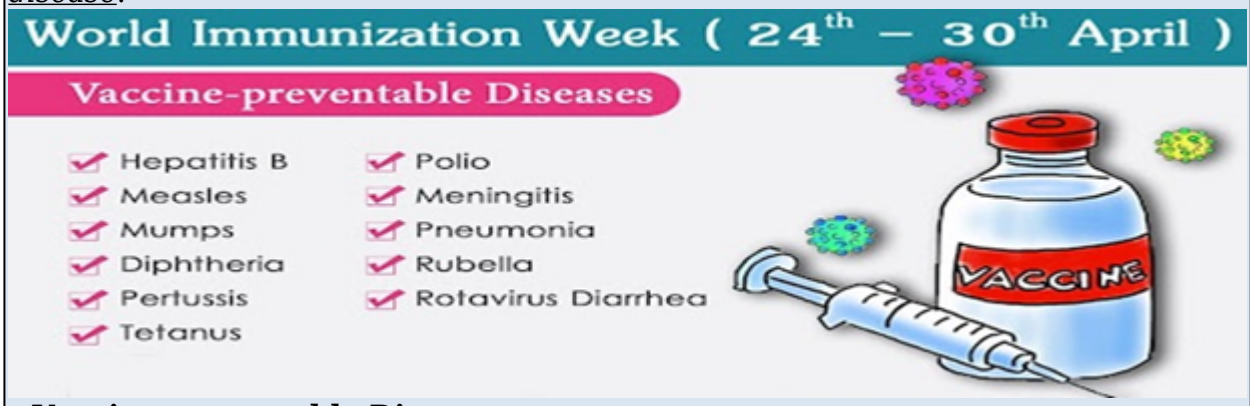
Prelims - *Science & Technology- Health | Current events of national and international importance.*

Why in News?

Recently, diseases that can be prevented through vaccination, such as measles, meningitis, and yellow fever, are re-emerging globally.

Vaccine

• **Vaccine** – A suspension of weakened, killed, or fragmented microorganisms or toxins or other biological preparation, such as those consisting of antibodies, lymphocytes, or messenger RNA (mRNA), that is administered primarily *to prevent disease*.



• **Vaccine preventable Diseases**
• **Importance** - It *reduces the incidence of infectious diseases* and it also builds herd immunity.
• Over the last 50 years, essential vaccines have *saved at least 154 million lives.*
- That's 6 lives a minute, every day, for 5 decades, noted WHO.
• WHO states that immunisation is a 'best buy' in health with a *return on investment of $54 for every dollar invested* and provides a foundation for future prosperity and health security.
• It accounts *improvement in infant survival.*
• The world has *eradicated smallpox and almost eradicated polio* through vaccination.

- **Reason for re-emergence** - A World Health Organization (WHO) rapid stock showed that many countries are facing *disruptions in vaccination campaigns, routine immunisation*, and access to supplies due to ***reduced funding***.
    - For instance, in 2023, an estimated 14.5 million children missed all their routine vaccine doses.
- WHO, UNICEF and Gavi have issued a joint warning stating that immunisation efforts are being threatened by *misinformation, population growth and humanitarian crises.*

***Gavi, the Vaccine Alliance**, is a public-private partnership that helps vaccinate more than half the world's children against deadly and debilitating infectious diseases. It has helped vaccinate more than 1.1 billion children in 78 lower-income countries, preventing more than 18.8 million future deaths.*

- **Impacts** – It puts *lives at risk* and exposing countries to *increased costs in treating diseases* and responding to outbreaks.
- **Measures** – Continuing investment in the ***'Big Catch-Up initiative',*** launched in 2023 to reach children who missed vaccines during the COVID-19 pandemic.
- ***Gavi's pledging summit*** on June 25, 2025 seeks to raise at least $9 billion from donors to fund an ambitious strategy to protect 500 million children, saving at least eight million lives from 2026 to 2030.

Vaccination in India

- **Universal Immunization Programme (UIP)** – It is one of India's most comprehensive public health initiatives, aiming to provide life-saving vaccines to millions of newborns and pregnant women each year.
- **Vaccine prevented diseases** – India was certified *polio-free in 2014* and *eliminated maternal and neonatal tetanus in 2015*.
- **Immunisation status** – According to the National Family Health Survey-5, 2019-21, India's full ***immunisation coverage stands at 76.1%***, which means that *1 child out of every 4 is missing out* on essential vaccines.

> *According to UNICEF, In India every year, nearly 26 million newborns and 34 million pregnant women are targeted for immunisation, and over 13 million immunisation sessions are held nationwide to vaccinate children and pregnant women.*

Reference

The Hindu| Reemergence of Vaccine Preventable Diseases

Bagram Airfield

Prelims (GS I) – *Current events of national and international importance.*

Mains (GS II) – *International relations*

Why in news?

Recently, U.S President claimed that China now occupied the Afghanistan's Bagram Airfield, which the US vacated in 2021.

- **Bagram Airfield –** It is the largest airfield in Afghanistan which is situated at 15 Km from Kabul.
- **Location** – Bagram Airfield is located in Parwan province.

- **Strategic importance** – Parwan province provides key connections to multiple Afghan regions through highways and tunnel.
- **Origin** – Built by the Soviet Union in the 1950s during Cold War competition for influence in Afghanistan.
- **Soviet era (1979-89)** – Served as a vital military base during the Soviet-Afghan War.
    - Used for deploying airborne divisions.
    - Base for Sukhoi Su-25 aircraft missions against mujahideen forces.
- **1990s** - Became a frontline in the conflict between Taliban and Northern Alliance, and suffered heavy damage.
- **US occupation (2001-2021)** – U.S occupied this airfield after the September 11, 2001 attacks.
- Over the next two decades, as the "War on Terror" raged on, Bagram became the epicentre of the American presence in Afghanistan.
    - It Expanded the Airfield with new run way, medical facilities and detention facilities.
- **US Withdrawal** – Trump administration signed a deal with Taliban in 2020 for NATO troop withdrawal.
- US forces vacated Bagram on July 2, 2021.
- Taliban took control of the base on August 15, 2021.
- **Significance of Bagram to China** – China has recently strengthened its relations with Afghanistan by approving its ambassadors with Taliban.
- It is significant because China has a sizable Muslim population of its own in the

bordering Xinjiang.
- Beijing would want to ensure that radical elements in Afghanistan do not cross over into its own territory.
- To that end, it has attempted to bolster ties within a limited framework and also made some investments in Afghanistan.

Reference

The Indian Express| Story of The Strategic Air Base in Afghanistan

Impact of Microgravity on Body Temperature

Prelims (GS I) – *General Science.*

Why in news?

Recent research by Indian Institute of Space Science and Technology (IIST) researchers have developed a 3D model shows that microgravity increases core body temperature in astronauts.

- **Microgravity** – It refers to a condition where the effects of gravity are significantly reduced, creating an apparent state of weightlessness.
- This is ***often seen in space***, where objects in orbit experience a continuous state of freefall.
- **Research model –** 3D computational model of human thermoregulation in microgravity developed by scientists researchers from IIST.
- This model imitates how heat moves through the body in a space environment, taking into account factors like sweating, shivering, clothing, organ heat and blood redistribution.

Key Findings of the Research

- **Core body temperature changes** - Microgravity consistently increases core body temperature.
- Core body temperature may increase from 36.3°C to 37.8°C (with 30% lower sweating and 36% higher metabolism) in 2.5 months under the influence of microgravity.

> *Core body temperature, is the operating temperature of an organism.*

- **Temperature distribution changes** – The temperature change is varying in different parts of the body with,
  - Feet and hands become cooler in microgravity.
  - Head, abdomen, and core become warmer.
  - Blood redistribution from lower limbs to upper body significantly impacts

temperature distribution.

- **Impact of Exercise** – It causes faster temperature rise in space than on Earth.
- During exercise in microgravity, body temperature could approach 40°C.
- **Model validation** – Successfully matched temperature data from Mir space station (Russia) and International Space Station
- **Applications** - The model has applications for space travel that keeps astronauts make informed decision.
- Clothing design for temperature regulation.
- Building architecture to reduce heat stress.
- Calculating universal thermal climate index.

Reference

The Hindu| Microgravity increases core body temperature

Basel, Rotterdam and Stockholm (BRS) COP 2025

Prelims (GS I) – *General issues on Environmental ecology.*

Mains (GS II) – *Conservation, environmental pollution and degradation.*

Why in news?

Recently India's delegation led by Minister of Environment, forest and ckimate change participated in the Conference of the Parties (COPs) to Basel, Rotterdam and Stockholm Conventions in Geneva.

- **BRS COPs 2025** – The Conference of the Parties (COPs) to the Basel, Rotterdam, and Stockholm (BRS) Conventions are meetings of governments from countries that have accepted, ratified, these conventions.
- These conventions address the *global trade and management of hazardous chemicals and wastes*.
- **Location –** Geneva.
- **Theme -** "Make visible the invisible: Sound management of chemicals and wastes".

Basel Convention
• Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. • **Adopted on -** 1989, entered into force in 1992. • **Focus -** Controls transboundary movements of hazardous wastes and their disposal. • Prior informed consent for waste shipments, environmentally sound management, waste minimization.
Rotterdam Convention

• Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. • **Adopted on -** 1998, entered into force in 2004. • **Focus -** Promotes shared responsibility in international trade of hazardous chemicals.
Stockholm Convention
• Stockholm Convention on Persistent Organic Pollutants. • **Adopted on -** 2001, entered into force in 2004. • **Focus -** Elimination or restriction of production and use of persistent organic pollutants (POPs). • Targets chemicals that persist in the environment, bioaccumulate, and pose risks to human health and ecosystems.

Key Intervention by India

- India emphasized that effective implementation of BRS Conventions requires,
  - Access to finance
  - Technology transfer
  - Capacity-building
  - Technical assistance
  - Strengthened international cooperation
- The delegation highlighted India's integrated approach through national legislation such as,
  - Environment (Protection) Act
  - Hazardous and Other Wastes (Management and Transboundary Movement) Rules
  - E-Waste Management Rules, 2016
- Shared India's best practices such as *ban on identified single-use plastic items* and *implementation of Extended Producer Responsibility (EPR) for plastic packaging.*

Reference

PIB| BRS COPs 2025

One Liners 06-05-2025
History, Art and Culture

7th Century Inscription Found in Davangere

Archaeologists recently discovered a 7th-century AD inscription at Madapura Lake in Nyamati taluk, Davangere district.

• **Old Kannada Script -** The five-foot-long inscription features 17 lines written in the ancient Old Kannada script.

• **Reign of Vikramaditya I -** The inscription is attributed to the rule of Vikramaditya I of the Badami Chalukya dynasty (654-681 AD).

• **Vikramaditya I's Rule -** Vikramaditya I, son of Pulakesin II, restored stability after a period of turmoil and successfully defended against Pallava invasions, reclaiming Vatapi.

• **Administrative and Social Insights -** The inscription offers crucial details about the administration and social organization prevalent during that era.

• **Tax Waiver and Land Donation -** It records a tax waiver for villagers by officer Singhavenna and a six-acre land donation for lake construction, highlighting welfare and early landholding.

ASI to Expand Underwater Archaeology Wing

Recently, Archaeological Survey of India (ASI) have decided to expand its Underwater Archaeology Wing (UAW) following its revival, focusing on exploring submerged cultural sites, including those in Maharashtra.

• **Premier Archaeological Agency** - The ASI is India's primary government agency responsible for the research, protection, preservation, and conservation of the nation's cultural heritage.

• **Historical Foundation** - Founded in 1861 by Alexander Cunningham under Lord Canning, the ASI was revived as a separate department in 1871, with Cunningham as its first Director-General, and is headquartered in New Delhi.

• **Aims and Core Functions** - The ASI aims to protect and conserve ancient monuments, conduct excavations (including underwater), maintain over 3,600 monuments, and publish research findings.

• **Underwater Exploration Focus** - Through its UAW, the ASI explores submerged heritage along coastlines and inland water bodies, now with renewed emphasis and expansion plans.

• **Collaborative Research Efforts** - The ASI collaborates with state departments, the Indian Navy, IITs, and international organizations to advance archaeological research, including underwater investigations.

Polity & Governance.

NH-6 Greenfield Corridor Approved

Recently, Centre has cleared the Greenfield NH-6 corridor, a vital infrastructure project linking Meghalaya and Assam.

• **Strategic Northeast Connectivity** - The Shillong–Silchar 4-lane access-controlled corridor aims to significantly enhance connectivity in the Northeast region.

• **Hilly Terrain** - Spanning 166.80 km, the corridor will navigate mostly hilly terrain in both states.

• **Connectivity** - It will connect Mawlyngkhung near Shillong in Meghalaya to Panchgram near Silchar in Assam.

• **Objective** - It aims to significantly boost connectivity in the Northeast, reduce travel time between Guwahati and Silchar, and improve logistics and economic development in the region. The travel time is expected to reduce from 8.5 hours to just 5 hours.

• **Features** - The highway will be a high-speed corridor with 19 major bridges, 153 minor bridges, 326 culverts, 22 underpasses, 26 overpasses, and 34 viaducts.

NHRC Addresses Kerala Jail Conditions

National Human Rights Commission (NHRC) has taken suo motu cognizance of reports highlighting poor infrastructure and staff shortages in Kerala jails, impeding inmates' access to education.

• **NHRC** - The NHRC is an independent statutory body in India established to safeguard and promote human rights, encompassing the rights to life, liberty, equality, and dignity of individuals.

• **Establishment and Legal Basis** - The NHRC was established on October 12, 1993, under the Protection of Human Rights Act, 1993, which was later amended in 2019.

• **Status and Headquarters -** It is a statutory, autonomous, and non-constitutional body with its headquarters located in New Delhi, India.

• **Composition of the Commission -** The NHRC is composed of a retired Chief Justice of India as its Chairperson, along with several members including judges, experts in human rights, and ex-officio heads of various National Commissions.

• **Mandate and Focus** - The NHRC's mandate includes addressing human rights violations and ensuring the protection and promotion of fundamental rights, as evidenced by its recent action concerning the conditions in Kerala jails.

Environment

European Red Admiral Sighted in India

European Red Admiral butterfly (Vanessa atalanta) has been documented for the first time in India, near Dharamshala in the Dhauladhar range.

• **Himachal's Butterfly Diversity Expands -** This sighting increases the recorded butterfly species in Himachal Pradesh to 440, highlighting the region's ecological significance.

• **Migratory Species -** The European Red Admiral is known for its long migratory journeys across Europe and North America.

• **Historical Absence in India -** This marks the first confirmed sighting in India, with the last South Asian record in Balochistan in 1929 and a 2022 rediscovery in Pakistan.

• **Identification Key Differences -** The European species has a narrower, deeper red band and a distinct spot on the upper forewing, differentiating it from the similar Indian Red Admiral.

• **Potential Range Expansion -** The sighting suggests a possible eastward expansion of the butterfly's Eurasian range, potentially aided by local climate and the presence of its larval food plant, stinging nettle.

Security

SAREX-22 Held in Chennai

Recently, Indian Coast Guard (ICG) conducted its 10th National Maritime Search and Rescue Exercise, SAREX-22, in Chennai. The drill involved various national organizations and 24 observers from 16 friendly foreign nations.

• **ICG Chief's Assessment -** ICG Chief VS Pathania reviewed the exercise, which aimed to test preparedness for maritime emergencies.

• **Emergency Rescue Demo -** An ICG Dornier aircraft demonstrated crucial techniques for rescuing passengers from distressed ships and aircraft, showcasing their operational capabilities.

• **Focus on Passenger Safety -** The biennial exercise centered on "Capacity Building Towards Marine Passenger Safety," underscoring the commitment to aid during major emergencies within and beyond India's ISRR.

• **SOPs and MRO Verification -** SAREX-22, spanning two days (August 27-28), aimed to validate Standard Operating Procedures (SOPs) and best practices for executing mass rescue operations (MRO).

Science

Shiv Shakti Point: Primitive Mantle Site

Recently, Scientists from Physical Research Laboratory (PRL) have identified the Shiv Shakti point on the Moon as significant for studying its primitive mantle. This is the landing site of India's Chandrayaan-3 mission.

• **Chandrayaan-3 Landing Site -** Located in the Moon's southern high-latitude highlands, the Shiv Shakti point marks India's first successful lunar landing site.

• **Potential for Early Moon Study -** This location is now recognized as a potential source of primordial lunar mantle materials, crucial for understanding the Moon's origins and evolution.

• **APXS Role in Analysis -** The Pragyan rover's Alpha Particle X-ray Spectrometer (APXS) was instrumental in this research, enabling in-situ analysis of lunar samples.

• **Volatile Element Concentrations -** Analysis at Shiv Shakti point revealed higher sulfur levels compared to previous missions, alongside lower concentrations of sodium and potassium.

• **Implications for Lunar History -** These elemental findings offer valuable insights into the Moon's early geological history and the composition of its primitive mantle.

Neuralink's Breakthrough FDA Designation

Neuralink, Elon Musk's neurotech firm, recently received FDA Breakthrough Device Designation for its brain-chip aimed at restoring communication for those with severe speech impairments.

• **FDA's Breakthrough Devices Program -** This FDA initiative accelerates the development and approval of medical devices offering more effective treatment for life-threatening conditions, ensuring quicker patient access.

• **Blindsight Chip for Vision Restoration -** Neuralink is also developing the Blindsight chip, an experimental device bypassing the eyes to directly stimulate the visual cortex, potentially restoring sight in completely blind individuals.

• **Technology: Ultra-Fine Electrodes -** Neuralink's devices use 1,024 ultra-fine electrodes to detect neural activity and transmit signals to a computer, which AI then decodes into intended movements.

• **Profound Impact on Speech Impairment -** This technology holds significant potential to improve the quality of life for individuals with conditions like ALS, restoring their ability to communicate and fostering emotional connections.

• **Future "Telepathy" and Beyond -** Neuralink envisions future applications enabling paralyzed individuals to control digital devices with their thoughts, a project dubbed "Telepathy," promising greater autonomy.

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