UPSC Daily Current Affairs| Prelim Bits 30-04-2025

RNA-based antiviral for Plant Virus

Prelims (GS I) - *General Science| Current events of national and international importance.*

Mains (GS III) – *Science and Technology- developments and their applications and effects in everyday life.*

Why in news?

Researchers recently reported developing an RNA-based antiviral agent that confers strong protection against cucumber mosaic virus (CMV).

- **Plant virus** – It is a ***microscopic, infectious agent*** that causes diseases in plants.
- It destroys a significant portion of annual crops worldwide.
- Unlike bacteria or fungi, viruses ***cannot be controlled*** with pesticides or fungicides.
- **Cucumber Mosaic Virus (CMV)**
- CMV is a plant virus that infects more than 1,200 plant species, including critical food crops like cucumbers, squash, and cereals, and medicinal plants.
- **Spread through -** *sap-sucking insects called aphids.*
- **Effects -** Infected plants develop mosaic discoloration, stunted growth, and commercially unviable fruits.
- **Severity -** Nearly 90 aphid species are capable of transmitting CMV, making outbreaks difficult to contain.

In India, CMV causes 25-30% yield losses in banana plantations.

Current RNA-based Crop Protection Techniques
• **RNA Silencing –** It is a ***natural defense mechanism*** in plants. • When a virus infects a plant, it introduces *double-stranded RNA (dsRNA)*. • The plant responds by activating Dicer-like enzymes (DCLs), which slice the dsRNA into small fragments called *small interfering RNAs (siRNAs)*. • These siRNAs guide the plant's defense system to recognize and destroy viral RNA. - **Limitations** – Not all siRNAs are effective, and some plant viruses can mutate rapidly. • **Host-induced gene silencing (HIGS)** – It works by *genetically modifying plants* to produce virus-fighting dsRNA in their cells. - **Limitations** - High production costs. • **Spray-induced gene silencing (SIGS)** - More flexible alternative to HIGS where plants are treated with *RNA sprays* instead of being genetically modified. - **Limitations** - Traditional dsRNA Spray formulations produce a random mix of siRNAs, and many are ineffective.

Key Findings of the Research

- Researchers first screened and identified the *most potent siRNAs* against CMV.
- These specially selected siRNA bind to the virus's genetic material to trigger a stronger antiviral response.
- Then they designed *effective dsRNA (e-siRNAs)* enriched with *highly functional siRNA*.
- These e-siRNAs were assembled into dsRNA constructs for more *targeted protection*.
- CMV infected plants treated with the *enhanced siRNA had* almost *80% lower viral load.*
- The new dsRNA formulation outperformed traditional dsRNA and it is effective against multiple CMV strains.

Advantages of the New Approach

- More *precise targeting of viral particles* of the most vulnerable genetic regions.
- Stronger defense by targeting multiple regions of viral genome simultaneously.
- The effective dsRNA can be redesigned in about a month to target new viral strains.

Reference

The Hindu| RNA-based antiviral

Indian Cybercrime Coordination Centre (I4C)

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

Mains (GS III) – *Basics of cyber security, money-laundering and its prevention.*

Why in news?

Recently, Union Ministry of Finance issued notification to include Indian Cyber Crime Coordination Centre (I4C) under the Section 66 of the Prevention of Money Laundering Act (PMLA).

- Indian Cyber Crime Coordination Centre (I4C) acts as a nodal point to ***curb cybercrime*** in the country.
- **Established on** – 2020.
- **Nodal ministry** – Ministry of Home Affairs.
- **Aim** – To provide a framework and eco-system for Law Enforcement Agencies (LEAs) for dealing with Cybercrime in a coordinated and comprehensive manner.
- **Functions** – It works to strengthen efforts against cybercrimes committed against women and children.
- It facilitates *easy filing of cybercrime-related complaints* and helps identify cybercrime trends and patterns.
- It also acts as an *early warning system* for law enforcement agencies to enable proactive cybercrime prevention and detection.
- It promotes *public awareness* about preventing cybercrimes.

- It assists States/UTs in building the *capacity of police officers*, public prosecutors, and judicial officers related to cyber-crime.
- States/UTs are primarily responsible for the prevention, detection, investigation, and prosecution of crimes, including cybercrime and digital arrest scams, through their law enforcement agencies (LEAs)

Cybercrimes fall in State subjects as per the 7th Schedule of the Constitution of India.

- **Data Sharing by Enforcement Directorate (ED)** – The Finance Ministry has included the I4C in the list of agencies with which the Enforcement Directorate is permitted to share information under the Prevention of Money Laundering Act (PMLA).
- **Reason** – The measure comes amid growing instances of cyber frauds, Digital arrest and most cyber frauds are *trans-national in nature*.
- I4C will be the 27th entity authorized for getting data from ED under Section 66 of Prevention of Money Laundering Act (PMLA), 2002.

Section 66 of PMLA empowers the head of the ED to share information to initiate action aginst violation of various laws.

- Other entities authorized for such data sharing include SEBI, RBI, CCI, SFIO, GST Council and others.
- **Significance** – The data from the Enforcement Directorate and other law enforcement agencies could help I4C to strengthen the country's fight against cyber-enabled financial crimes.

The 'Citizen Financial Cyber Fraud Reporting and Management System', under I4C, launched in 2021 to enable immediate reporting of financial frauds and prevent the siphoning off of funds by fraudsters.

Reference

The Business Line| ED to share data with I4C

National Investigation Agency (NIA)

Prelims – *Current events of national and international importance*

Mains (GS III) | *Various Security Forces & Agencies & Their Mandate*

Why in News?

In a major update in the Pahalgam terror attack case, the Ministry of Home Affairs (MHA) recently handed over the investigation to the National Investigation Agency (NIA).

- It is the ***central counter-terrorism law enforcement agency*** in India.
- **Established in** - 2008.
- **Head Quarters** - New Delhi.
- **Nodal Ministry** – Ministry of Home Affairs (MHA).
- **Purpose -** To ***investigate and prosecute offences*** affecting the sovereignty, security and integrity of India, security of State, friendly relations with foreign States and actions violating existing Acts and international treaties.
- **Established under - *National Investigation Agency Act, 2008*** after the deadly 26/11 terror attacks on Mumbai.
- **Investigation of Scheduled offences -** If the Central government believes that a Scheduled Offence has been committed and is to be investigated under the Act, it may, Suo motu (on its own), direct the agency.
- These include offences under Acts such as the Atomic Energy Act, 1962, and the Unlawful Activities Prevention Act, 1967.
- The Centre can also receive reports from state governments for such cases.
- The State Government shall extend all assistance and co-operation to the Agency for investigation of the Scheduled Offences.
- **Special Courts** - The legislation grants authority to both central and state governments to set up Special Courts for adjudicating scheduled offences, with the right to appeal to the High Court of the relevant state.

National Investigation Agency (Amendment) Act, 2019
• **Jurisdiction of the NIA-** Empowered NIA to investigate scheduled offences involving Indian citizens or Indian interests that are committed outside India. • **Scheduled offences –** The mandate of NIA has also been expanded to investigate offences related to Explosive Substances Act, 1908, Human Trafficking, Counterfeit currency or bank notes, Cyber Terrorism and Arms Act, 1959. • **Special Courts -** The legislation grants the central government the authority to appoint Sessions Courts as Special Courts for the adjudication of specified offences. • Additionally, state governments are now permitted to designate Sessions Courts as Special Courts as well. • When more than one Special Court has been designated for any area, the senior-most judge will distribute cases among the courts.

Reference

IndiaTVNews | National Investigation Agency

Pandit Chatur Lal

Prelims – *Current events of national importance*

Mains - *Indian culture | Indian Music Heritage*

Why in News?

The Department of Posts, Government of India, will release a commemorative stamp to honour Pandit Chatur Lal in his centenary year celebrations.

- He was the ***1st Indian percussionist to introduce tabla to the West*** in the 1950s.
- **Born in –** Udaipur.
- Chatur Lal came from a family of court musicians and farmers.
- **Musical Career** - He learned tabla under the aegis of Ustad Abdul Hafiz Ahmed Khan, who trained from Jehangir Khan, the court musician of Indore who had trained in the ***Farukhabad and Lucknow styles.***
- He played a crucial role in connecting Indian classical rhythms with Western music, paving the way for subsequent ***Indo-jazz ensembles such as Shakti.***
- In 1952, Menuhin (American-born British violinist) visited India experienced a private concert featuring Shankar and Chatur Lal, which profoundly impacted him.
- **Awards –** He was the first Indian percussionist to be nominated at the Oscars in 1957 for his work in the Canadian short film ***A Chairy Tale***.
- He was honoured with a ***Special BAFTA Award.***
- **Passed away in** – 1965.

Reference

The Indian Express | Pandit Chatur Lal

Ayushman Vay Vandana scheme

Prelims – *Current events of national importance*

Mains (GS II)– *Government Policies & Interventions | Issues relating to development and management of Social Sector/Services relating to Health*

Why in News?

The Delhi government launched the Ayushman Vay Vandana scheme recently.

- This initiative is a ***senior healthcare-centric extension*** of the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PMJAY) scheme.
- It offers senior citizens a comprehensive health cover of up to Rs 10 lakh annually.
- **Age requirement -** 70 years or above.
- **Nodal Ministry –** Ministry of Health and Family Welfare.
- **Objectives -** Offer free healthcare services for elderly individuals.
- Provide access to a network of government and private hospitals for cashless treatments.
- Ensure financial assistance for costly treatments, medicines, and associated healthcare needs.
- **Free diagnostics -** All diagnostic tests and health check-ups are provided free of cost.
- **Vay Vandana Card -** Under the scheme, each registered senior citizen will be

provided with a unique health card.
- This card will store their health records, health check-up information and emergency service details.
- The card provides access to a wide range of healthcare services at both government and private hospitals that are part of the ABPM-JAY network.
- **Eligibility -** Everyone will benefit from this scheme, regardless of their financial background.
- **Treatments covered -** Coronary angioplasty, hip fractures/replacement, gallbladder removal, cataract surgery, prostate resection, and stroke, among others.

Reference

Deccan Herald | Ayushman Vay Vandana scheme

One Liners 30-04-2025

Polity & Governance

Central Consumer Protection Authority (CCPA)

CCPA has suo moto taken action against five Delhi restaurants for failing to refund mandatory service charges, defying a Delhi High Court ruling.

• **Protecting Consumer Rights** - This move underscores the CCPA's commitment to safeguarding consumer rights and preventing the forced payment of additional service charges.

• **Legality of Service Charges** - According to the law, hotels and restaurants cannot compel consumers to pay service charges, nor can these charges be levied under any other guise.

• **About the CCPA** - Established under the Consumer Protection Act, 2019, the CCPA, operational since July 20, 2020, replaced the 1986 Act. It operates under the Ministry of Consumer Affairs, Food & Public Distribution.

• **Key Functions and Powers** - The CCPA protects consumer rights as a class, prevents unfair trade practices and misleading ads, initiates class-action suits (including recalls and refunds), conducts investigations, and imposes penalties.

• **CCPA Structure** - The CCPA is headed by a Chief Commissioner and includes two other commissioners, one overseeing goods-related issues and the other handling service-related complaints.

Environment

Mahuadanr Sanctuary

Mahuadanr wolf sanctuary in Jharkhand recently garnered attention due to a distinctive practice observed by local tribal communities adhering to the 'Sarna faith'.

• **Winter Forest Avoidance** - These communities traditionally avoid entering the Sal forests during the winter months, a unique cultural observance.
• **Crucial Wolf Breeding Season** - Interestingly, this period of avoidance by the Sarna community perfectly coincides with the critical breeding and denning season of the Indian grey wolf within the sanctuary.
• **India's First Wolf Sanctuary** - Mahuadanr Wolf Sanctuary, situated in Jharkhand's Latehar district, holds the distinction of being India's first and only sanctuary dedicated to the Indian grey wolf (*Canis lupus pallipes*).
• **Established for Wolf Protection** - Declared in 1976, this sanctuary was specifically created to safeguard the vulnerable Indian wolf population.
• **Sanctuary Area** - The protected area spans approximately 63 square kilometers, providing a crucial habitat for the wolves.
• **Part of Palamau Tiger Reserve** - Mahuadanr Wolf Sanctuary forms an integral part of the larger Palamau Tiger Reserve.
• **Key Wildlife Species** - Besides the Indian wolf, the sanctuary is home to other wildlife including spotted deer, wild boar, hyena, and bear.
• **Conservation Significance** - This unique sanctuary plays a vital role in the conservation efforts for the Indian grey wolf within its natural habitat

Science

Indian National Space Promotion and Authorisation Centre (IN-SPACe) Launches Satellite Bus as a Service (SBaaS)

Recently, IN-SPACe has launched the SBaaS initiative.

• **Empowering Private Space Sector** - SBaaS encourages private Indian companies to design and develop satellite-bus platforms, fostering indigenous capabilities.
• **Reducing Import Dependence** - This initiative aims to decrease India's reliance on imported satellite technology, promoting self-sufficiency in the space sector.
• **What is a Satellite Bus?** - A satellite bus is the central, modular structure of a satellite, housing essential operational systems to which the mission-specific payload is attached.
• **SBaaS Initiative Objectives** - Includes promoting innovation among Indian Non-Governmental Entities (NGEs) and facilitating the development of small satellite-bus platforms for various applications.
• **Global Service Provider Goal** - Ultimately, SBaaS seeks to position India as a global hub for small satellite-bus and hosted-payload services.

Agentic AI Demand Surge

Recently, India faces a critical shortage of agentic AI professionals as demand skyrockets due to the increasing adoption of sophisticated AI agents.

• **Talent Supply Gap** - The current pool of under 100,000 experts struggles to meet the projected need of 200,000 by 2026, creating a significant talent gap.

• **Intense Hiring Competition** - This shortage fuels intense competition among Global Capability Centers (GCCs), IT firms, and startups, leading to rapidly increasing salaries.

• **Defining Agentic AI** - Agentic AI refers to intelligent systems with the capacity for autonomous decision-making, independent action-taking, and continuous learning in complex environments.

• **'Service as Software' Shift** - This technology enables a shift towards a 'service as software' model, allowing tech companies to deliver enhanced value compared to traditional 'software as a service'.

• Agentic AI Problem-Solving - Agentic AI systems solve problems by ingesting diverse data, independently analyzing challenges, developing strategic solutions, and autonomously executing tasks.

AI Kiran: Empowering Women in AI

Recently, the AI Kiran, a national movement co-led by the Principal Scientific Adviser (PSA), Verix, and INK Women, aims to boost women's leadership in India's rapidly growing AI sector.

• **Addressing Gender Disparity** - Despite rising STEM enrollment, women hold only 33% of junior and 19% of senior GenAI roles, highlighting the urgent need for diverse leadership to combat algorithmic bias.

• **Goals** -The initiative seeks to empower women innovators, create an inclusive AI ecosystem, develop funding, and provide mentorship, learning, and leadership opportunities.

• **Recognizing Women Leaders** - AI Kiran spotlights over 250 prominent women in AI across sectors like education and healthcare, amplifying their voices and inspiring future generations.

• **Collaborative Multi-Stakeholder Approach** - AI Kiran fosters partnerships between government, corporations, and civil society to create pathways and support for women in AI, hosted on the Manthan Platform

3D Microscope for Glaucoma Surgery

Army Hospital (Research and Referral), New Delhi, has pioneered the use of a 3D microscope in India for minimally invasive glaucoma surgery.

• Understanding Microscopes - A microscope magnifies small objects, revealing details invisible to the naked eye, utilizing light or electron manipulation through refraction, diffraction, or digital imaging.

• Science Behind Magnification- Microscopes employ lenses or sensors to focus light or electron beams, generating enlarged images of minute structures for detailed observation.

• Types of Microscopes - Various types exist, including optical microscopes using light, electron microscopes using electron beams (TEM, SEM), digital microscopes capturing digital images, and 3D microscopes offering spatial visualization.

• About 3D Microscopes - 3D digital microscopes capture multiple focal planes to construct high-resolution, three-dimensional images of specimens. They use 3D polarization glasses and a 4K display.

• Advantages of 3D Microscopy - Benefits include enhanced surgical precision, lower complication rates, improved surgeon comfort, and eco-friendly operation with reduced light exposure and power usage.

Pregnancy Anaemia and Heart Defects

A recent UK study suggests that anaemia in pregnant women may be linked to a 47 percent increased risk of congenital heart conditions in their newborns.

• **Understanding Anaemia** - Anaemia is characterized by insufficient healthy red blood cells or haemoglobin, hindering oxygen transport to the body's tissues, leading to fatigue and weakness.

• **Haemoglobin's Crucial Role**- Haemoglobin, a protein in red blood cells, is vital for carrying oxygen from the lungs to all organs throughout the body.

• **Global Anaemia Prevalence** - The WHO estimates significant anaemia rates globally: 40% in young children, 37% in pregnant women, and 30% in women of reproductive age.

• **Types and Severity of Anaemia**- Anaemia has various forms, both inherited and acquired, and can range from mild to severe, with severe cases potentially being life-threatening or indicating serious illnesses.

• **Management and Prevention** - Treatment involves supplements or medical procedures. Iron-deficiency anaemia, a common type, is often due to insufficient iron intake or absorption, or blood loss. A healthy diet can help prevent some forms.

Disaster Management

Sachet App: Real-Time Disaster Alerts

National Disaster Management Authority (NDMA) Sachet app enhances disaster preparedness by delivering real-time, geo-tagged alerts for various disasters like floods and cyclones via the Common Alerting Protocol (CAP).

• **Localized and Comprehensive Coverage -** Users can subscribe to alerts for specific states or districts, receiving localized awareness and covering a wide range of disasters.

• **Key Features -** App provides daily weather updates from IMD, critical information from government sources, Dos and Don'ts for disasters, and helpline numbers. Satellite connectivity ensures communication during network failures.

• **Multi-Language Accessibility -** Supporting 12 Indian languages with translation and read-out options, the app promotes inclusivity and is available on Android and iOS.

• **Operation Brahma: India's Humanitarian Aid –** PM Modi highlighted India's aid to Myanmar post-earthquake through Operation Brahma, showcasing commitment to international disaster response.

• **Empowering Individual Alertness -** The Sachet app empowers citizens with timely information, encouraging proactive measures and safeguarding lives during emergencies.

• The Common Alerting Protocol (CAP) is a standardized message format designed for all media, all hazards, and all communication channels.

• That is, a universal format for emergency alerts, ensuring critical information reaches everyone.

Miscellaneous

Shahid Rajaee Port Explosion

An explosion recently occurred at Iran's Shahid Rajaee port, the country's largest and most advanced terminal, within the Bandar Abbas Port Complex.

• **Rocket Fuel Shipment Involved** - The explosion reportedly involved a shipment of "sodium perchlorate rocket fuel," a substance used in missile production.
• **Strategic Location of Bandar Abbas** - Bandar Abbas Port is strategically situated on the Strait of Hormuz in southern Iran, west of the Chabahar port.
• **Global Oil Trade Hub** - Notably, approximately 20 percent of the world's oil trade transits through the Strait of Hormuz, highlighting the port's global significance.
• **Key Persian Gulf Gateway** - The port serves as a crucial maritime link between the Persian Gulf and the Gulf of Oman.
• **Implications of the Incident** -The explosion at this key Iranian port, involving missile fuel, raises concerns about potential disruptions and security in a vital global trade route.

Ramanujan's Life in New Book

Recently, National Archives of India and Vani Prakashan will launch "Ramanujan: Journey of a Great Mathematician" tomorrow, April 30, 2025.

• Significance of the Launch- The event celebrates Srinivasa Ramanujan, a globally influential Indian mathematician, highlighting his enduring impact and India's archival wealth.
• Book's Central Theme - Authored by Arun Singhal and Devendra Kumar Sharma, the book explores Ramanujan's extraordinary life, genius, and significant mathematical contributions despite limited formal education.
• Key Research Insights - Based on rare original documents and personal letters, the book offers a deeper understanding of Ramanujan's thinking and achievements.
• Focus on Struggles and Context - It also sheds light on his personal challenges and the historical and cultural backdrop that influenced his groundbreaking work.
• Collaborative Effort - The National Archives of India, preserving national heritage, and Vani Prakashan, a noted publisher, have collaborated to bring Ramanujan's inspiring story to a wider audience.

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