UPSC Daily Current Affairs| Prelimbits 26-07-2025

NISAR (NASA-ISRO Synthetic Aperture Radar)

Prelims *- Current events of National & International importance and General Science.*

Why in News?

NISAR will be launched by Geosynchronous Satellite Launch Vehicle (GSLV) from the Satish Dhawan Space Centre in Sriharikota.

- **NASA-ISRO SAR (NISAR) Mission –** It is a ***unique Earth observation satellite,*** and the first satellite to observe the Earth with a dual frequency *Synthetic Aperture Radar (SAR).*
  - **Dual frequency SAR** — NASA's L-band and ISRO's S-band.
- It is the first joint collaboration between ***NASA and ISRO.***
- **Aim –** To deliver extensive environmental and geological data to scientists worldwide.
- **Features**
  - **Launch Vehicle -** GSLV-F16 rocket.
  - **Orbit -** Sun-synchronous orbit at a distance of 743km with an inclination of 98.40 degrees.
  - **Payload capacity –** 2,392 kg.
  - **Antenna & reflector -** NASA's 12m unfurlable mesh reflector antenna, integrated to ISRO's modified I3K satellite bus.
  - **High-Resolution Imaging -** It uses Sweep SAR (Swept Synthetic Aperture Radar) technology for the first time.
  - **All-Weather, Day & Night Operation** - NISAR's radar systems can penetrate clouds and light rain, enabling continuous data collection regardless of weather conditions or time of day.
- **Goals**
  - Monitoring ecosystem changes and measuring forest biomass.
  - Tracking earthquakes, landslides, and volcanic deformation.
  - Studying glacier retreat and polar ice movement.
  - Measuring soil moisture and detecting groundwater variations.
  - Generating 3D surface maps of land and ice with high precision twice every 12 days after launch.
- **Significance**
  - **Disaster response** - Rapid detection of earthquakes, floods, and landslides could help save lives and infrastructure.
  - **Agriculture and water management** - Accurate data on soil moisture and crop health can inform drought mitigation and boost food security.

- **Climate monitoring** - Continuous tracking of forests, glaciers, and wetlands enhances climate resilience.
- **Technological advancement -** Developing and operating dual-band radar technology strengthens ISRO's future missions.
- **Global data access -** All NISAR data will be freely available worldwide, enhancing India's standing in global Earth science.

Synthetic Aperture Radar (SAR)
• SAR is a technology that uses microwave pulses instead of visible light to create high-resolution images. • It works regardless of lighting or weather conditions like darkness, clouds, or smoke. • A SAR system uses a small antenna on a moving platform like a satellite to record echoes from the ground. • By combining these signals with precise timing and phase data, it mimics a very large antenna. • **All-Weather, Day-Night Capability** – Microwaves can penetrate clouds, rain, and smoke, enabling SAR to operate 24/7. • It can detect surface features and changes invisible to optical cameras.

Reference

The Hindu| NISAR First joint Satellite of NASA and ISRO

Destructive Power of the Beetle-Fungi Association

Prelims - *Current events of national and international importance | Science and technology*

Why in News?

A recent study reported that the Ambrosia beetle has share a mutualistic relationship with two fungal species, Fusarium ambrosia and Fusarium solani.

Ambrosia beetle
• Invasive insects which is *native to Central and South America.* • **Scientific name -** Euplatypus parallelus. • The species has spread to other regions, including Africa, Asia, and Oceania. • It is a ***polyphagous pest*** that attacks a wide range of tree species, both broad-leaved and coniferous. • While it primarily infests stressed or dying trees, it can also breed in healthy trees, especially in thinner trunks. • This beetle is known for its symbiotic relationship with fungi, which it introduces into the tree, leading to potential damage and even tree death in severe cases. • Ambrosia beetles get their name from *the ambrosia fungi that call the beetle their home,* is not taxonomic but ecological

- **Symbiotic relationship with fungi** - Ambrosia beetles carry and cultivate ambrosia

fungi within their galleries, which the larvae and adults feed on.

- **First reported -** In 2012, cashew trees of Ponda, Goa.
- **Process of destruction -** Attack stressed or infected trees by sensing a volatile compound of ethanol released by these trees.
- Beetles bore galleries in the bark, carry fungi into inside and farm the fungi to concentrate nutrients.
- Systemic infections progress through the plant xylem, blocking the xylem vessels.
- Fungus inside the xylem leads to sporulation, which leads to secrete several enzymes, weakening the wood strength and result in death of the plant.

In other insect hosts, the fungi are present in sacs called mycangia. In the present study the mycangia in the ambrosia beetle is absent.

- **Impact**
  - Weakening the structure, causing severe leaf fall, trunk drying, and in some cases even tree death.
  - Affects *total latex production* from rubber trees, causing economic and agricultural losses.
  - Affect other significant plants, such as coffee, cashew, mango, and coconut, vulnerable to infections.
- **Prevention -** Using antifungal agents, removing the infected part of trees, burning or chipping away any part that displays holes, and traps for ambrosia beetles.
- **Challenges**
  - Fungi reside in deeper parts of an infected plant, where insecticides or fungicides often don't reach.
  - If fungi have progressed systemically, it's difficult to save a plant.
- **Sustainable treatments -** Antagonistic fungi that can compete with the pathogens.
- Microbial consortia with a diversity of bacterial species that can live inside plants, mitigating fungal infections.

Quick Facts

• **India -** World's sixth-largest producer of rubber and second-highest in terms of productivity.
• Kerala produces 90% and accounts for 72% of India's rubber cultivation area.

Reference

The Hindu| Destructive Power of the Beetle-Fungi Association

Risk of Chikungunya Epidemic

***Prelims**: Current events of National & International importance and General Science.*

Why in News?

Recently, the World Health Organization warned that a major chikungunya virus epidemic risks sweeping around the globe, calling for urgent action to prevent it.

- **Earlier major outbreak –** Chikungunya epidemic swept across the Indian Ocean, hit small island territories before spreading globally and affecting almost half a million people, in 2004-05.
- **Recent major chikungunya outbreaks -** Since the beginning of 2025, Reunion, Mayotte, and Mauritius have all reported One-third of the population of Reunion is estimated to have been infected.
- It is spreading to countries like Europe, Italy, France, Madagascar, Somalia, Kenya, and South Asia.
- **Chikungunya –** It is a ***mosquito-borne viral disease*** that causes fever and severe joint pain, which is often debilitating.
- **Nomenclature** - The name derives from the Kimakonde language of southern Tanzania, meaning "that which bends up" and describes the contorted posture of infected people with severe joint pain.
- **Transmission -** It is ***transmitted to humans*** by the bites of infected female mosquitoes, most commonly Aedes aegypti and Aedes albopictus mosquitoes, known as the ***tiger mosquito***
- It is venturing farther north as the world warms because of human-driven climate change.
- Bite primarily during daylight hours, *with peak activity often in the early morning and late afternoon.*
- **Symptoms -** It causes fever and severe joint pain, which is often debilitating and may be prolonged.
- **Other symptoms -** Joint swelling, muscle pain, headache, nausea, fatigue, and rash.
- **Diagnostics -** Detected directly in blood samples collected during the first week of illness using tests such as reverse transcriptase–polymerase chain reaction (RT–PCR).
- **Treatment and vaccines -** There is no specific antiviral drug treatment for CHIKV infections.
- The clinical management includes addressing fever and joint pain with anti-pyretic and optimal analgesics, drinking plenty of fluids, and general rest.
- **Diagnosis issues -** According to the WHO, the symptoms of chikungunya are similar to those of dengue fever and Zika virus disease, making it difficult to diagnose.
- **Fatality rate -** Less than 1 % but counts thousands of deaths in a million cases.
- **Vulnerability -** Populations have little or no immunity, and the virus can quickly cause significant epidemics, affecting up to three-quarters of the population.
- **Prevention -** Control of the mosquito vectors and reduction of mosquito breeding sites.
    - Reducing mosquito breeding sites through emptying and cleaning containers that contain water weekly.
    - Disposing of waste and supporting local mosquito control programmes.

Reference

The Hindu| Alarm on Risk of Chikungunya Epidemic

Election to the Office of Vice President of India

Prelims - *Current Events of National and International Importance | Indian Polity & Governance.*

Why in News?

Recently, the resignation of Vice-President Jagdeep Dhankhar, the Election Commission of India will have to announce the election to fill the position.

The election of the next Vice-President is to be held ***within 60 days*** *of the expiry of the outgoing Vice-President's term.*

- **Vice-President -** Second highest office, next to the President in the official warrant of precedence.
- **Office -** Modelled in the lines of the *American Vice-President*.
- **Source of power - Article 66(1)** of Indian constitution.
- **Mode of election -** ***Indirect election*** held in accordance with the system of proportional representation by means of the single transferable vote and the voting is by secret ballot.
- **Elected by -** Electoral college consist of both elected and nominated members of the Parliament.
- **Vote of choice -** Members of the Electoral College can vote according to their choice and are not bound by any party whip.
- **Winning percentage -** 50% of the valid votes + 1.
- **Qualifications**
    - Citizen of India.
    - Completed 35 years of age.
    - Qualified for election as a member of the Rajya Sabha.
    - Not hold any office of profit under any government.
- **Nomination of a candidate**

    - Supported by at least 20 electors as proposers and 20 electors as seconders as presented to the Returning officer.
        - Security deposit of Rs.15,000 in the Reserve Bank of India.

- **Condition of office**
    - He should *not be a member* of either House of Parliament or a House of the state legislature.
    - If such a person is elected as Vice-President, he should vacate his seat in that House on the date on which he enters the office as Vice-President.
- **Term of Office**
    - 5 years from the date on which he enters upon his office.
    - Hold office beyond his term of five years until his successor assumes charge.
    - Eligible for re-election for any number of terms.
- **Vacancy in Office**

    - On the expiry of his tenure of five years.
    - By his resignation.
    - On his removal.
    - By his death.
    - Becomes disqualified to hold office or when his election is declared void.
    - Constitution does not provide any method of succession apart from a fresh election.
    - In such an event, the Deputy Chairman can head the Rajya Sabha proceedings.
- **Election dispute**
    - All doubts and disputes regarding the election of the Vice-President are inquired into ***and decided by the Supreme Court,*** whose decision is final.
    - The election cannot be challenged on the ground that the electoral college was incomplete (i.e., the existence of any vacancy among the members of the electoral college).
    - If the election is declared void by the Supreme Court, acts done by him before such declaration are not invalidated (i.e., they continue to remain in force).

Reference

The Hindu| Election to the Office of Vice President of India