Prelim Bits 06-07-2023 | UPSC Daily Current Affairs

Cucumber Mosaic Virus (CMV) & Tomato Mosaic Virus (ToMV)

The current sharp increase in the price of tomato is due to lower production of the vegetable because of CMV and ToMV viruses in Maharashtra and Karnataka.

Virus	Cucumber mosaic virus (CMV)	Tomato Mosaic Virus (ToMV)
Origin	It was first found on cucumber and other cucurbits.	It was first found in tomatoes in Europe.
Distribution	It is distributed worldwide, primarily in temperate to tropical climate zones.	It is distributed worldwide, primarily in temperate to tropical climate zones.
Family	*Bromoviridae*	*Virgaviridae*
Hosts	Cucumber, melon, eggplant, tomato, carrot, lettuce, celery, cucurbits squash, pumpkin, zucchini, some gourds, and some ornamentals.	Tomato, tobacco, peppers, and certain ornamental plants.
Spread	Spread by aphids, which are sap-sucking insects. CMV can spread through human touch, but the chances of that are extremely low.	Spread by infected seeds, saplings, agricultural tools. It can spread through the unsanitised hands of nursery workers.
Favorable conditions to spread	Conditions of high temperature followed by intermittent rain, which allow aphids to multiply.	It can transmitted plant-to-plant by many species of aphids. It would require only a few infected saplings for the virus to take over an entire field in a matter of days.
Damage	It can cause almost 100% crop loss unless properly treated on time.	It can cause almost 100% crop loss unless properly treated on time.
Symptoms	CMV causes distortion of leaves. **In *cucumber*** - the virus causes a mosaic-like pattern of alternating yellow and green spots. **In tomato** - fruit formation is affected, and in some cases the fruit is distorted and small.	The foliage of plants shows alternating yellowish and dark green areas, which often appear as blisters on the leaves. Distortion of leaves and twisting of younger leaves. The fruit develops necrotic spots, which leads to overripening.

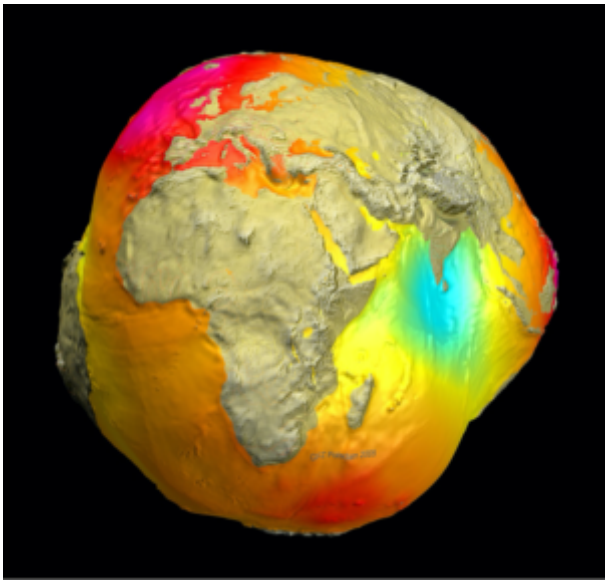
Reference

The Indian Express | CMV and ToMV

Indian Ocean Geoid Low (IOGL)

Recently researchers from the Indian Institute of Science may have uncovered the cause of the mysterious 'gravity hole' in the Indian Ocean.

- **Geoid** - The geoid is a model of global mean sea level that is used to measure precise surface elevations.
- Due to the uneven distribution of mass throughout the Earth, the geoid's shape is smooth but irregular.
- The shape is also affected by the planet's rotation, gravitational forces, and internal structure.



- In the absence of tides and currents on the oceans, all the water would settle onto a geoid, rising wherever there is high gravity, and sinking where gravity is low.
- The resulting unevenness in the ocean surface, known as *geoid anomalies*.
- **Indian Ocean Geoid Low (IOGL)** – One of the most pronounced geoid lows on Earth lies just southwest of the Indian peninsula, *the Indian Ocean geoid low (IOGL).*
- It was discovered in 1948 during a survey by Dutch geophysicist *Felix Andries Vening Meinesz.*
- Here gravity is *lower than average*, thus making the sea level *106 meters* lower than the global average at the site.
- IOGL is a consequence of a mass deficit inside the Earth's mantle beneath the Indian Ocean.
- **Formation** - Previous studies on the gravity anomaly focused solely on its present-day state, without delving into its origins.
- The Gravity Hole is estimated to have assumed its current form around *20 million years ago* and is predicted to endure for millions more.
- The IOGL comprises slabs from the *Tethys Ocean* which separated the supercontinents of Gondwana and Laurasia.

- The ocean is believed to have agitated the African *Large Low Shear Velocity province*, (LLSVP) also known as the "African blob," generating plumes beneath the Indian Ocean.
- These plumes, along with the mantle structure in the vicinity of the geoid low, are responsible for the formation of this negative geoid anomaly.

References

The Indian Express | Gravity hole in the Indian Ocean

The Hindustan Times | What is a 'Gravity Hole'?

Republic World | Scientists Unveil Huge 'gravity Hole' In Indian Ocean

Acceleration Agenda

United Nations Secretary-General Antonio Guterres suggested the Acceleration Agenda at the SCO summit address that held recently.

- **Aim** – It helps to end the dependence on fossil fuels while providing universal, affordable and sustainable energy for all.
- It primarily focused on how Shanghai Cooperation Organization (SCO) members can contribute to the fight against climate change.
- The agenda includes some points to tackle climate change
    - It calls for *developed countries* to reach net-zero emissions of coal as close as possible to *2040* and *emerging economies* as close as possible to *2050*.
    - It urges developed countries to phase out coal by 2030 and developing countries by 2040.
    - It suggests to end *all international* public and private funding of coal.
    - It is to ensure using unabated coal for electricity will be net-zero by 2035 for all developed countries and 2040 for the rest of the world.
    - It suggests to cease all licensing or funding of new oil and gas and consistent with the findings of the International Energy Agency.
    - It suggests to stop any expansion of existing oil and gas reserves.
    - It suggests to acheive a global phase down of existing oil and gas production, compatible with the 2050 global net-zero target.
    - It also calls for the delivery of the $100 billion dollars to developing countries, doubling of adaptation finance and the operationalisation of the loss and damage fund.

Reference

Down to Earth | Climate action is fight of our lives

IEA | Case Study on coal

UNSC | Secretary-General Calls on States to Tackle Climate Change

Climate change & Infochemicals

Climate change is altering the production of info-carrying chemicals such as pheromones.

- Infochemicals are perhaps the most prevalent mode of communication in nature.
- Infochemicals transfer information within and among species in the form of chemical signals.
- They include - hormones, pheromones, and allelochemicals.
- **Significance -** It plays a central role in mediating information and shaping interactions within and between individuals.
- **Functions** - Infochemicals influence a broad range of functions and behaviours such as -
- **Prey and Predator** - Establish relationship between them to help shape natural ecosystems by maintaining their equilibrium.
    - **Example** - Sharks use these chemicals to “sniff” out their prey over mindboggling distances.
- **Feeding** - These chemicals can affect foraging and feeding too.
    - **Example** - It is released by some plant species to attract pollinators but repel those that may cause harm.
- **Threat information** - In some cases, a plant under attack may even tell its neighbours of impending doom so they can respond accordingly.
- **Habitat selection** - Infochemicals can influence habitat selection.
    - **Example** - Barnacle larvae select a suitable surface on which to attach through infochemicals.
- **Reproduction** - Infochemicals are also used by species to recognise potential mates and boost their chances of reproducing.
    - **Example** - Some bat species can “sniff” out a mate with the greatest genetic diversity.
- **Changing infochemicals -** Climate change is altering the production of these info-carrying chemicals such as pheromones.
- Alterations in *temperature, carbon dioxide and pH levels* can affect every single aspect of the fundamental processes that organisms use to communicate with each other.
- Climate change is not just affecting individual species it can cause info-disruption across whole ecosystems.
- **Anti-predator behaviour in Fishes -** Many fish release certain chemicals when they are harmed by a predator or are otherwise in danger.
- Their fellow fish use the presence of these chemicals, detected through smell, as a warning.
- Climate change caused a reduction in *anti-predator behaviour* in some fish species by decreasing their anxiety towards potential predators.
- When more CO_2 is absorbed in the water and the pH level is reduced, the *alarm cue (hypoxanthine-3-N-oxide*) is irreversibly changed and fish find it harder to detect.

Reference

Down to Earth | Climate change is causing a communication breakdown

Khazans of Goa

The National Green Tribunal (NGT) dismissed the proceedings for carrying out illegal construction and illegal filling of eco-sensitive, low-lying khazan lands.

- Generally any low-lying land close to a mangrove-fringed estuary reclaimed by salinity control structures can be called as khazan land.
- Khazans are reclaimed lands from the river or the sea; Khazans in Goa are coastal wetlands.
- True Khazan lands are carefully designed as topo-hydro-engineered agro-aquacultural ecosystems.
- The most important aspect of the structure of these lands is based on the principle of *salinity regulation* and *knowledge of the tidal clock*.
- The control of balance between the availability and flow of freshwater (rainfall+aquifer): saline (estuarine) water that determines the existence of the Khazan lands.
- The structure of these lands depends on their distance from the nearest watershed and the tidal estuary.
- Khazan lands have 3 main features - sluice gate, poim and 2 types of bunds.
- **Bunds** are classified as Inner and Outer bunds.
    - The outer bund protects the field from the tidal flows of the river.
    - The inner bunds protect from any form of nutrient leaching.
- Clay known as chanoy is used as a filler in between 2 outer layers of the outer bund to withstand any vulnerability from the tidal waves.
- A created *network of bunds* protects the agricultural fields and adjoining villages from tidal flows.
- Mangroves acts as a natural bund.
- **Poim -** A depression at the end of the khazan lands to act as a repository for excess water and protects agricultural fields from high tides.
- **Sluice gate -** Located at the mouth of the rivulet entering a farmland to control the water levels.
- **Goan Khazans -** Khazans probably originated among the prehistoric *Gowda Tribes* of Goa.
- Some popular spots are along the *Chapora River*, as it flows past Siolim, Kudal, Oxel, and Camurlim.
- Ribandar, Chorao and Divar islands also have Khazan lands.
- Goan Khazan is useful for *aquaculture, agriculture and salt panning.*

Gowda Tribes

- The Gowda are the major tribe in Goa.
- They are believed to be the original inhabitants of Konkan.
- The Gowda tribals practice Hindu religion and worship *lord Malikkarjun* who is another form of Lord Shiva.

Reference

Down to Earth | Goa khazan lands

[India waterportal | Lost ghazans of Goa]

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