

DAILY CURRENT AFFAIRS (DCA)

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Table of Content

- Supreme Court upholds 'secular, socialist' in Preamble of the Constitution
- U.N. Resolution on Crimes Against Humanity
- Global Cooperative Conference
- National Mission on Natural Farming (NMNF)
- Global Matchmaking Platform for Industrial Decarbonisation

NEWS IN SHORT

- One Nation One Subscription (ONOS) scheme
- PAN 2.0 Project
- GI Tag to Narasapur Crochet Lace
- Atal Innovation Mission (AIM) 2.0
- Major Atmospheric Cherenkov Experiment (MACE) Telescope
- Milky Way
- Genetically Modified (GM) Maize
- Baalbek, Tyre and Anjar

SUPREME COURT UPHOLDS 'SECULAR, SOCIALIST' IN PREAMBLE OF THE CONSTITUTION

Context

- The Supreme Court in an order, upheld the inclusion of 'socialist and secular' in the Preamble of the Constitution.

Background

- The order was based on a batch of petitions filed in 2020 challenging the validity of the inclusion of 'socialist' and 'secular' in the Preamble through the 42nd Constitution Amendment in 1976.
- The petition argued that the insertions were made with retrospective effect.

Supreme Court ruling

- The court interpreted that the word 'secular' denotes a Republic that upholds equal respect for all religions.
 - 'Socialist' represents a Republic dedicated to eliminating all forms of exploitation, whether social, political, or economic.
- The Supreme Court reaffirmed that the Preamble is an integral part of the Constitution.
- Also the Constitution is a "living document" and can evolve according to the needs of society.

Secular Ethos in India

- Secularism is enshrined not just in the Preamble but in various constitutional provisions that guarantee equal treatment of all religions (Articles 15, 16, 25).
- The principle of secularism ensures that the Indian State remains impartial, protecting the rights of citizens regardless of their religious affiliations.

Socialism in India

- Socialism in India finds its origins in the freedom movement, where leaders like Jawaharlal Nehru and Subhas Chandra Bose championed a state-driven economy for equitable growth.
- Development in India;
 - Nehruvian Model:** Adoption of state-led industrialization and planned economic development, exemplified by the establishment of Public Sector Undertakings (PSUs).
 - Land Reforms:** Redistribution of land to address feudal inequalities.
 - Social Justice Movements:** Enactment of affirmative action policies like reservations for

Scheduled Castes, Scheduled Tribes, and Other Backward Classes.

Concluding remarks

- The Supreme Court's ruling affirms the constitutionality of the 42nd Amendment and reinforces the vision of a secular and socialist India, reflecting the nation's commitment to equality, justice, and social welfare.
- This decision reiterates the dynamic nature of the Constitution, which can evolve to reflect the changing needs of society while preserving its core principles.

Source: TH

U.N. RESOLUTION ON CRIMES AGAINST HUMANITY

In News

- The U.N. The General Assembly's legal committee adopted a resolution to begin negotiations for a treaty on preventing and punishing crimes against humanity.

U.N. resolution on Crimes Against Humanity

- The resolution was supported by 98 countries, including Mexico and Gambia, and is seen as necessary to address the gap in international law on crimes against humanity (a topic not covered by existing treaties on war crimes, genocide, and torture).
- While the International Criminal Court (ICC) prosecutes war crimes, genocide, and crimes against humanity, it lacks jurisdiction in many countries.
 - The new treaty would address crimes against humanity in countries outside the ICC's jurisdiction.
- Importance : The resolution is seen as a significant step in international law, addressing impunity for crimes against humanity in places like Ethiopia, Sudan, Ukraine, Gaza, and Myanmar.

Need for a Treaty on Crimes Against Humanity

- Addressing a Legal Gap:** Existing international law, such as the Rome Statute of the International Criminal Court, primarily addresses crimes committed during armed conflict. However, many heinous crimes against humanity occur outside the context of war, such as genocide, persecution, and apartheid.

- **Comprehensive Legal Framework:** Offers victims pathways for justice and assists countries in incorporating crimes against humanity into national legal systems.
- **Fostering Global Cooperation:** Enables international collaboration, such as through mutual legal assistance and extradition agreements.

Crimes Against Humanity

- **Brief:** These are crimes committed as part of a widespread attack against any civilian population.
 - ♦ **Examples:** Includes acts like murder, extermination, enslavement, torture, rape, sexual violence, sexual slavery, and other inhumane acts.
- Elements
 - ♦ **Physical:** The act must involve one of the following:
 - Murder, extermination, enslavement, deportation, imprisonment, torture
 - Grave sexual violence, persecution, enforced disappearance, apartheid, or other inhumane acts.
 - ♦ **Contextual:** The act must be part of a widespread or systematic attack on a civilian population, not just isolated incidents.
 - ♦ **Mental:** The perpetrator must be aware that their actions are part of a larger attack against civilians.
 - ♦ **No Need for Armed Conflict:** Crimes against humanity can occur during times of peace, unlike war crimes that are linked to armed conflict.
 - ♦ **Target:** Unlike genocide, crimes against humanity are not aimed at a specific group but any civilian population.
- Challenges in Prosecution
 - ♦ Prosecuting crimes against humanity poses significant challenges.
 - These include gathering sufficient evidence, ensuring witness protection, and navigating political complexities.
 - Additionally, the principle of state sovereignty can sometimes hinder international intervention and justice.

Recent Examples

- Recent history has seen numerous instances of crimes against humanity.
- The conflict in Syria, the Rohingya crisis in Myanmar, and the situation in Darfur, Sudan, are notable examples where widespread and systematic attacks against civilian populations have been documented.

Role of the International Community

- The international community plays a crucial role in addressing crimes against humanity.
- Organizations like the United Nations and the International Criminal Court work to investigate, prosecute, and prevent these crimes.
 - ♦ **International Criminal Court (ICC):** The ICC is the permanent court responsible for prosecuting crimes against humanity.
- **National Courts:** Countries that incorporate crimes against humanity into their criminal law can also prosecute these crimes

Existing Mechanisms to Prevent Crimes Against Humanity

International Humanitarian Laws:

- Geneva Conventions (1949): Protects civilians and non-combatants in armed conflicts.
- Biological Weapons Convention (1972): Prohibits biological weapons.
- Chemical Weapons Convention (1993): Bans chemical weapons.
- Rome Statute (1998): Establishes the ICC to prosecute genocide, war crimes, and crimes against humanity.

Framework in India:

- Article 51: Promotes international peace and adherence to international law.

Source: TH

GLOBAL COOPERATIVE CONFERENCE

Context

- PM Modi inaugurated the first International Global Cooperative Conference in Delhi and launched the UN International Year of Cooperatives 2025.

About

- **Host:** The Global Conference is hosted by Indian Farmers Fertiliser Cooperative Limited (IFFCO), in collaboration with ICA and Government of India, and Indian Cooperatives AMUL and KRIBHCO.
- **First Time in India:** ICA Global Cooperative Conference and ICA General Assembly is being organised in India for the first time in the 130 year long history of International Cooperative Alliance (ICA).
 - ♦ ICA is the premier body for the Global Cooperative movement.

- **Theme:** Cooperatives Build Prosperity for All.
 - ♦ The theme aligns with the Indian Government's vision of "Sahkar Se Samridhi" (Prosperity through Cooperation).

What are Cooperatives?

- A cooperative (or co-op) is an organization or business that is owned and operated by a group of individuals who share a common interest, goal, or need.
- These individuals, known as members, participate in the cooperative's activities and decision-making process, typically on a one-member, one-vote basis, regardless of the amount of capital or resources each member contributes.
- The main purpose of a cooperative is to meet the economic, social, or cultural needs of its members, rather than to maximize profits for external shareholders.
- The UN SDGs recognize cooperatives as crucial drivers of sustainable development, particularly in reducing inequality, promoting decent work, and alleviating poverty.

97th Constitutional Amendment Act 2011

- It established the right to form cooperative societies as a fundamental right (Article 19).
- It included a new Directive Principle of State Policy on the Promotion of Cooperative Societies (Article 43-B).
- It added a new Part IX-B to the Constitution titled "The Co-operative Societies" (Articles 243-ZH to 243-ZT).
- It authorizes the Parliament to establish relevant laws in the case of multi-state cooperative societies (MSCS) and state legislatures in the case of other cooperative societies.

Benefits of Cooperatives:

- **Democratic Control:** Members have a voice in decision-making.
- **Economic Participation:** Profits are distributed based on usage or contribution, not capital invested.
- **Community Focus:** Co-ops often aim to benefit local communities by keeping resources and profits within the group.
- **Better Services/Prices:** By pooling resources, cooperatives often offer better services or prices than for-profit businesses.

Types of Cooperatives in India:

- **Agricultural Cooperatives:**
 - ♦ **Dairy Cooperatives:** Focus on the collective production, processing, and marketing of dairy products (e.g., Amul).
 - ♦ **Farmers' Cooperatives:** Provide services like access to seeds, fertilizers, and agricultural equipment, and help with marketing and processing crops.
 - ♦ **Fishermen Cooperatives:** Support fishermen in managing resources and marketing their catch collectively.
- **Consumer Cooperatives:** These cooperatives are formed to provide goods and services to members at reasonable prices, reducing reliance on middlemen. Examples include consumer stores and fair-price shops.
- **Worker Cooperatives:** In these cooperatives, workers own and manage the business, sharing profits and decision-making. Examples include small-scale manufacturing cooperatives or artisan co-ops.
- **Credit Cooperatives:** Cooperative Banks and Credit Societies offer financial services, such as savings accounts, loans, and credit, to members, particularly in rural and underserved areas.
- **Housing Cooperatives:** These cooperatives help members collectively build or manage housing projects, providing affordable living spaces, especially in urban areas.

Success Stories of Cooperatives in India:

- **Amul (Gujarat):** Amul, a dairy cooperative, has been one of India's most successful cooperatives, transforming the dairy sector by empowering millions of small farmers and bringing India to the forefront of the global dairy market.
- **Irrigation Cooperatives in Maharashtra:** Water-user associations and cooperatives in Maharashtra have successfully managed water resources for irrigation purposes, helping farmers achieve better yields.
- **Kerala's Co-operative Movement:** Kerala has one of the most successful cooperative movements in India, with strong cooperatives in sectors like banking, farming, consumer goods, and housing.

Challenges Faced:

- **Weak Governance:** They are issues of poor management, corruption, and political interference, leading to inefficiency and lack of transparency.

- **Limited Access to Credit:** Many cooperatives struggle with access to financing, which hinders their ability to expand or improve their operations.
- **Competition from Private Sector:** Cooperatives often face stiff competition from large private enterprises and multinational corporations, especially in sectors like retail and agriculture.
- **Technological Gaps:** Many cooperatives, especially in rural areas, lack access to modern technology or are slow to adopt new systems that could improve efficiency.

Legal Framework and Support for Cooperatives:

- In India, cooperatives are governed by the Cooperative Societies Act, which is implemented at both the state and national levels.
 - ♦ **The Multi-State Cooperative Societies Act (2002):** This law regulates cooperatives that operate in more than one state.
 - ♦ **The National Cooperative Policy (2002):** Aimed at creating an enabling environment for the cooperative movement, it focuses on improving governance, member participation, and financial sustainability.
 - ♦ **The Ministry of Cooperation:** Established in 2021, this ministry focuses on supporting the growth of cooperatives in India, including reforming their governance and providing financial support.

Way Ahead

- Cooperatives in India have proven to be an essential tool for economic empowerment, especially for marginalized groups, and contribute significantly to rural development.
- However, for cooperatives to thrive in the modern economy, governance reforms, better access to technology and credit, and increased member engagement are necessary.
- With the right support and reforms, cooperatives can continue to contribute to inclusive growth and social development in India.

Source: PIB

NATIONAL MISSION ON NATURAL FARMING (NMNF)

Context

- The Union Cabinet announced National Mission on Natural Farming (NMNF) as a standalone Centre-sponsored scheme under the Ministry of Agriculture & Farmers' Welfare.

Background

- **2019:** Zero Budget Natural Farming (ZBNF) was renamed Bhartiya Prakritik Krishi Paddhti (BPKP) and integrated as a sub-scheme under the Paramparagat Krishi Vikas Yojana (PKVY).
- **2023-24:** BPKP was further renamed as National Mission on Natural Farming (NMNF).
 - ♦ Under BPKP the financial assistance was provided for 3 years @ Rs. 12,200/ha.

Need

- There is a need to improve the quality of soil and maintain the health of the people with chemical-free food.
- The Mission is designed to support farmers to reduce input cost of cultivation and dependency to externally purchased inputs.
- To scientifically revive and strengthen agriculture practices towards sustainability, climate resilience and healthy food.

Major Highlights of the National Mission on Natural Farming (NMNF)

- **Aim:** To promote natural farming among one-crore farmers across the country.
- **Cluster-Based Approach:** Targeting 15,000 clusters in Gram Panchayats allows for focused implementation and better resource allocation.
- **Bio-Input Resource Centers (BRCs):** Establishing 10,000 BRCs will ensure easy access to essential bio-inputs, making it convenient for farmers to adopt natural farming practices.
- **Model Demonstration Farms:** 2000 NF Model Demonstration Farms shall be established at Krishi Vigyan Kendras (KVKs), Agricultural Universities (AUs) and farmers' fields.
 - ♦ They shall be supported by experienced and trained Farmer Master Trainers.
- **Certification and Market Access:** A simplified certification system and dedicated branding will facilitate market access for natural farming products.

Natural Farming

- Natural farming is an approach to agriculture that emphasizes working with nature's processes to grow crops in a sustainable and holistic way.
- It follows local agro-ecological principles rooted in indigenous knowledge, location-specific technologies, and adaptations to local agro-ecology.

- One of the central ideas of natural farming is to minimize reliance on external inputs and create a system that can sustain itself over the long term.
- **Key practices of natural farming include:**
 - ♦ Minimal Soil Disturbance;
 - ♦ Use of Organic Inputs;
 - ♦ Biodiversity and Polyculture;
 - ♦ Water Conservation;
 - ♦ Natural methods to manage pests;
 - ♦ Synthetic fertilizers, herbicides, and pesticides are avoided.
- **Market Demand:** Although organic products are gaining popularity, natural farming does not always meet mainstream market expectations or certification standards.

Government Initiatives

Natural Vs. Organic Farming

- Natural farming emphasizes minimal intervention with nature, avoiding tilling, fertilizers, and even weeding.
 - ♦ It focuses on creating self-sustaining ecosystems with little to no external inputs, trusting nature to maintain soil health and manage pests.
- Organic farming follows specific certification standards that prohibit synthetic chemicals and genetically modified organisms (GMOs).
 - ♦ It allows the use of organic fertilizers, pesticides, and tilling.
 - ♦ It tends to be more structured and regulated than natural farming.
- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** The promotion of drip and sprinkler irrigation systems under this program can be adapted to natural farming practices.
- **Soil Health Card Scheme:** Launched in 2015, this initiative provides farmers with soil health cards that offer detailed information about the nutrient content and pH levels of their soil.
- **National Mission on Sustainable Agriculture (NMSA):** Launched in 2014, encourages the adoption of sustainable farming techniques, including natural farming, to improve soil health, conserve water, and enhance productivity.
- **National Organic Farming Research Institute (NOFRI):** It focuses on improving soil health, developing organic farming technologies, and promoting sustainable agricultural practices.
- **States Practicing:** There are several states practicing Natural Farming.
 - ♦ Prominent among them are Andhra Pradesh, Himachal Pradesh, Gujarat, Kerala, Jharkhand, Odisha, Madhya Pradesh, Rajasthan, Uttar Pradesh and Tamil Nadu.

Benefits of Natural Farming

- **Environmental Sustainability:** It helps protect soil health, reduces pollution, and supports biodiversity.
- **Resilience to Climate Change:** Natural farming promotes agricultural practices that can adapt to changing climates, such as drought-tolerant crops and sustainable water use.
- **Healthier Food:** Food produced without chemical fertilizers and pesticides is considered safer and more nutritious.
- **Economic Benefits:** Over time, natural farming can reduce costs related to chemical inputs and increase the resilience of farms, potentially leading to higher yields.

Challenges

- **Learning Local Ecosystem:** It requires a deep understanding of local ecosystems, which can take time to learn and apply effectively.
- **Labor-Intensive:** In the transition period, natural farming is more labor-intensive and initially produces lower yields compared to conventional farming.

Way Ahead

- The Government is increasingly recognizing the importance of natural farming in addressing environmental challenges, improving farmer incomes, and ensuring food security.
- These efforts, when combined with local farmer participation and state-level innovation, hold great promise for the future of sustainable agriculture in India.

Source: IE

GLOBAL MATCHMAKING PLATFORM FOR INDUSTRIAL DECARBONISATION

Context

- On the Energy Day at COP29, the United Nations Industrial Development Organization (UNIDO) and the Climate Club launched the Global Matchmaking Platform (GMP).

Global Matchmaking Platform (GMP)

- GMP aims to bridge the gap between the demand for industrial decarbonisation solutions and the resources needed to implement them, particularly in heavy-emitting industries.
- **The platform is designed to:**
 - ♦ **Address Funding Challenges:** Aims to tackle the annual funding gap of \$125 billion required to meet net-zero goals.
 - ♦ **Provide Tailored Solutions:** Matches the unique industrial decarbonisation needs of various countries with technical and financial resources.
 - ♦ **Foster Collaboration:** Strengthens cooperation between governments, international organisations, and private entities.
- Participants include Germany, Chile (co-chairs of the Climate Club), Uruguay, Turkey, Bangladesh, Indonesia, and non-state actors like the World Bank and Climate Investment Funds (CIF).

Need for Industrial Decarbonisation

- Heavy industries like steel, cement, and chemicals contribute 70% of CO emissions from the industrial sector.
 - ♦ Decarbonisation is critical to meet global climate goals, including the Paris Agreement targets.
- **Sustainability:** Industrial decarbonisation reduces reliance on fossil fuels and encourages the adoption of renewable energy and circular economy practices.
- **Economic Growth:** Transitioning to green industrial methods fosters innovation, creates jobs in clean technology sectors, and ensures long-term economic resilience.

Challenges in Industrial Decarbonisation

- **Financial Constraints:** Annual investments in net-zero industrial technologies need to increase from \$15 billion to \$70 billion by 2030, reaching \$125 billion by 2050.
- Emerging and Developing Economies (EMDEs) face hurdles such as limited resources, outdated technology, and development priorities, making industrial decarbonisation challenging.
- **Policy and Regulatory Hurdles:** Inconsistent global standards and regulations for industrial decarbonisation impede progress.

Way Ahead

- **Enhanced Funding Mechanisms:** Encourage private sector participation through incentives

and risk-sharing mechanisms to bridge the funding gap.

- **Capacity Building:** Promote research in clean industrial processes, and provide technical assistance for institutional capacity enhancement in EMDEs.
- **Policy Alignment:** Align industrial decarbonisation goals with national priorities, and foster inclusive global cooperation under the Climate Club.

Initiatives for Industrial Decarbonization

Global:

- EU's Carbon Border Adjustment Mechanism (CBAM): Prevents carbon leakage with tariffs on carbon-intensive imports.
- Green Hydrogen Initiatives: Led by countries like Germany and Japan to decarbonize heavy industries.
- Global Cement and Concrete Association (GCCA): Targets net-zero emissions by 2050 using alternative fuels and carbon capture.

Indian:

- National Hydrogen Mission: Pushes green hydrogen to decarbonize steel and cement.
- PAT Scheme: Reduces energy consumption in energy-intensive industries.
- Zero Effect Zero Defect (ZED): Encourages SMEs to adopt sustainable practices.
- Renewable Energy Targets: Aims for 500 GW capacity by 2030 to green industrial energy.

Climate Club

- The Climate Club, is an international coalition that fosters collaboration on decarbonising industrial sectors.
- It was established at COP28 and has 38 member countries including the European Union, Kenya, and Switzerland.
- Its 2025–26 work programme focuses on three pillars:
 - ♦ Pillar 1: Advancing ambitious and transparent climate change mitigation policies,
 - ♦ Pillar 2: Transforming industries,
 - ♦ Pillar 3: Boosting international climate cooperation and partnerships.

Source: DTE

NEWS IN SHORT

ONE NATION ONE SUBSCRIPTION (ONOS) SCHEME

Context

- The Union Cabinet has approved the Central Sector Scheme, One Nation One Subscription (ONOS).

One Nation One Subscription (ONOS) scheme

- **Aim:** To consolidate the subscription to academic journals and research publications under a centralized system.
 - ♦ It enables access to all journal articles in India through a single centrally negotiated payment model.
 - ♦ The scheme will replace individual institutional subscriptions with a national-level subscription, ensuring uniform access to research content.
- **Funding and Duration:** The central government has allocated 6,000 crore for the period of 3 years from 2025 to 2027.
- **Eligibility:** The benefits are extended to:
 - ♦ All higher education institutions under central and state governments.
 - ♦ Research and Development (R&D) institutions managed by the central government.
- **Implementing Agency:** The Information and Library Network (INFLIBNET), an autonomous center under the University Grants Commission (UGC), will coordinate the scheme at the national level.

Source: TH

PAN 2.0 PROJECT

In News

- The Cabinet Committee on Economic Affairs (CCEA), chaired by Prime Minister Narendra Modi, approved the PAN 2.0 Project of the Income Tax Department.

About PAN 2.0 Project

- It is an e-Governance initiative aimed at re-engineering taxpayer registration services through technology, enhancing the digital experience for taxpayers.
 - ♦ It has a budget of Rs. 1435 crore.

- It will upgrade the existing PAN/TAN 1.0 system, consolidating core and non-core activities, including PAN validation services.
- It aligns with the Digital India vision, aiming to use PAN as a common identifier across all digital systems of specified government agencies
- **Key Benefits:**
 - Improved access and faster service delivery with better quality.
 - Ensures a single, consistent source of truth.
 - Promotes environmentally friendly processes and cost optimization.
 - Strengthened infrastructure for greater security and operational flexibility.

Do you know ?

- **Permanent Account Number (PAN) is a ten-digit alphanumeric number issued by the Income Tax Department to individuals or entities for tax purposes.**
- PAN links all transactions of the holder (such as tax payments, TDS/TCS credits, income tax returns, and specified transactions) with the tax department, acting as an identifier.
- Structure of PAN: The first three characters (e.g., "AFZ") are alphabetic and follow a series from "AAA" to "ZZZ."
 - ♦ The fourth character (e.g., "P") indicates the status of the PAN holder (e.g., "P" for Individual, "F" for Firm, etc.).
 - ♦ The fifth character (e.g., "K") represents the first letter of the holder's last name or surname.
 - ♦ The next four characters (e.g., "7190") are a sequential number ranging from 0001 to 9999.
 - ♦ The last character (e.g., "K") is an alphabetic check digit.
 - Example: A typical PAN looks like AFZPK7190K.

Source: PIB

GI TAG TO NARASAPUR CROCHET LACE

In News

- Narasapuram lace from the West Godavari district, Andhra Pradesh, received the Geographical Indication (GI) tag.

About

- **Narasapuram lace:** Made using cotton threads in a variety of colors. Crafted with thin crochet needles of varying sizes for intricate designs.
- **GI Tag:** It is a sign used on products that have a specific geographical origin and possess qualities or a reputation.
 - ♦ The registration is valid for 10 years, renewable thereafter.
 - ♦ Managed by the Department for Promotion of Industry and Internal Trade (DPIIT), under the Ministry of Commerce and Industry.
- **Significance of the GI Tag:** Enhances market stability for weavers and artisans.
 - ♦ Boosts visibility of their craftsmanship.

Source: TOI

ATAL INNOVATION MISSION (AIM) 2.0

Context

- The Cabinet approved the continuation of Niti Aayog's flagship initiative Atal Innovation Mission (AIM) till March 31, 2028.

About

- Atal Innovation Mission (AIM) is an initiative under NITI Aayog launched in 2016.
- **Aim:** To foster innovation at the grassroots level by providing support to students, startups, and entrepreneurs.
- **Key Components:**
 - ♦ **Atal Tinkering Labs (ATLs):** School-based innovation hubs that encourage students to explore STEM fields and develop creative skills.
 - ♦ **Atal Incubation Centers (AICs):** Centers that support startups by providing infrastructure, mentorship, and funding.
 - ♦ **Atal New India Challenges (ANIC):** A platform to support innovation-driven solutions to national challenges.
 - ♦ **Atal Community Innovation Centers (ACICs):** Innovation hubs that focus on solving community-specific problems in rural and underserved areas.
 - ♦ **Mentor of Change (Mentorship and Partnerships - with Public, Private sector, NGOs, Academia, Institutions):** To enable all the initiatives to succeed AIM has launched one of the largest mentor engagement and management programs "Mentor India – The Mentors of Change".

- AIM 2.0 is a step towards Viksit Bharat that aims to expand, strengthen, and deepen India's already vibrant innovation and entrepreneurship ecosystem.
 - ♦ It aims to break the language barrier through the Language Inclusive Program of Innovation (LIPI) and 30 vernacular innovation centres.

Source: BS

MAJOR ATMOSPHERIC CHERENKOV EXPERIMENT (MACE) TELESCOPE

Context

- The Major Atmospheric Cherenkov Experiment (MACE) telescope, inaugurated in Hanle, Ladakh.

About

- It is built collaboratively by Bhabha Atomic Research Centre (BARC), Tata Institute of Fundamental Research (TIFR), and Indian Institute of Astrophysics (IIA).
- Located at around 4.3 km above sea level, it is the highest imaging Cherenkov telescope in the world.

Components of MACE

- **Light Collector:** It comprises 356 mirror panels in a honeycomb structure for optimal light reflection and stability.
 - ♦ It is coated with silicon dioxide for environmental protection.
- **High-Resolution Camera:** It is equipped with 1,088 photomultiplier tubes to detect faint Cherenkov radiation signals.
 - ♦ It has integrated electronics for real-time data processing and digital conversion.
- **Movement:** Uses an altitude-azimuth mount for vertical and horizontal adjustments. It moves on a 27-metre curved track with a total weight of 180 tonnes.

Working Principle

- **Cherenkov Radiation:** Gamma rays interact with atmospheric molecules, creating electron-positron showers.
 - ♦ The charged particles emit blue light (Cherenkov radiation) when moving faster than the speed of light in air.
- **Detection:** MACE captures Cherenkov radiation using its light collector and camera, allowing indirect study of high-energy gamma rays.

Significance of MACE

- Enables the study of gamma rays exceeding 20 billion electron volts (eV).
- Explores astrophysical phenomena near black holes, gamma-ray pulsars, blazars, and gamma-ray bursts.

Gamma Rays

- Gamma rays are produced by exotic energetic objects in the cosmos, including rapidly spinning pulsars, supernova explosions, hot whirlpools of matter around black holes, and gamma-ray bursts.
- Properties: Shortest wavelengths and highest energy in the electromagnetic spectrum.
 - ♦ The energy levels exceed 100,000 eV, compared to visible light's 1.63-3.26 eV.
- Hazards: It can damage living cells and cause genetic mutations. The earth's atmosphere blocks gamma rays from reaching the ground.

Source: TH

MILKY WAY

In News

- Scientists have identified a source of extremely hot gas (10 million degrees Kelvin) surrounding the Milky Way galaxy.

What is a Galaxy?

- A galaxy is a large group of stars, gas, and dust bound together by gravity.
- Galaxies come in different shapes and sizes

About

- The Milky Way is a large barred spiral galaxy. It is made up of approximately 100 billion stars.
 - ♦ All stars visible to the naked eye in the night sky are part of the Milky Way Galaxy.
- Our Solar System is about 25,000 light years from the center of the Milky Way.



- It takes the Sun 250 million years to orbit the center of the Milky Way.
- **Spiral Arms:** Current data suggests the Milky Way has four spiral arms.
- **Galaxy's Gas Reserve:** The Milky Way has a massive reserve of gas, which is the primary source for star formation, but this gas is difficult to measure due to its tenuous nature.
- **Recent Discovery:** More recently, X-ray emissions detected from the galaxy suggested the presence of even hotter gas at around ten million degrees Kelvin, leading to further studies.
 - ♦ The X-ray emitting hot gas is attributed to a puffed-up region around the stellar disc of the Milky Way, where ongoing star formation occurs. Supernovae explosions from massive stars heat the gas to high temperatures.

Other Galaxies

- Billions of other galaxies exist; three can be seen without telescopes – the Large and Small Magellanic Clouds, and the Andromeda Galaxy.
 - ♦ The Large and Small Magellanic Clouds are 160,000 light years away, visible from the southern hemisphere.
 - ♦ **Andromeda Galaxy:** 2.5 million light years away, visible from the northern hemisphere, predicted to collide with the Milky Way in about 4 billion years.

Source: PIB

GENETICALLY MODIFIED (GM) MAIZE

Context

- Scientists have found that the Genetically modified (GM) maize, which is illegal in India, has been detected in commercially sold processed and unprocessed maize grains in the country.

What are GM crops?

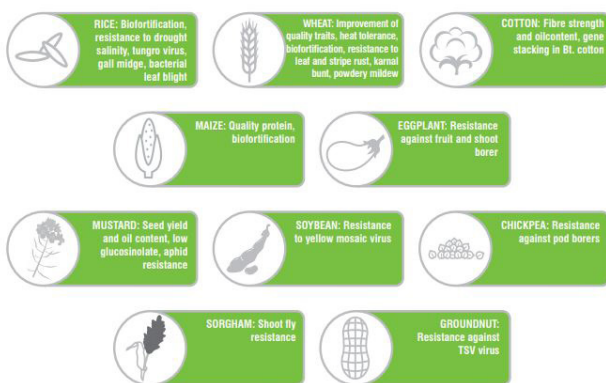
- Crops that have undergone genetic engineering processes to alter their DNA are referred to as genetically modified crops.
- This alteration is done to introduce desirable traits such as resistance to pests or herbicides, improved nutritional content, or increased yield.
- **The process of creating GM crops typically involves:** identification of desired traits, isolation of genes, insertion into crop genome, and expression of the trait.

- The techniques used in GM crops are: gene guns, electroporation, microinjection, agrobacterium etc.
- The types of modification are: transgenic, cis-genic, subgenic and multiple trait integration.
- The main trait types in GM crops are herbicide tolerance (HT), insect resistance (IR), Stacked traits etc.

Indian Scenario in GM crops

- **Bt Cotton:** In 2002, the GEAC had allowed the commercial release of Bt cotton.
 - ♦ Bt cotton has two alien genes from the soil bacterium *Bacillus thuringiensis* (Bt) that allows the crop to develop a protein toxic to the common pest pink bollworm.
 - ♦ Till now, it is the only GM crop that is allowed in India.
- Many varieties of GM crops are under different stages of development, like Bt brinjal and DMH-11 mustard.

GM crops R&D in India



Source: DTE

BAALBEK, TYRE AND ANJAR

Context

- Cultural professionals have urged the United Nations to take immediate measures to protect Lebanon's world heritage sites against Israeli attacks.

About

- Lebanon is home to some of the most iconic UNESCO World Heritage Sites like Baalbek, Tyre, and Anjar.
 - ♦ **Baalbek:** It is situated in eastern Lebanon, near the Syrian border.
 - ♦ **Tyre:** It is a port city on Lebanon's Mediterranean coast.
 - ♦ **Anjar:** It is located in the Bekaa Valley.
- The petition emphasizes enforcing international laws like the 1954 Hague Convention to safeguard cultural heritage during armed conflicts.

Source: TH