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CROPS Mission

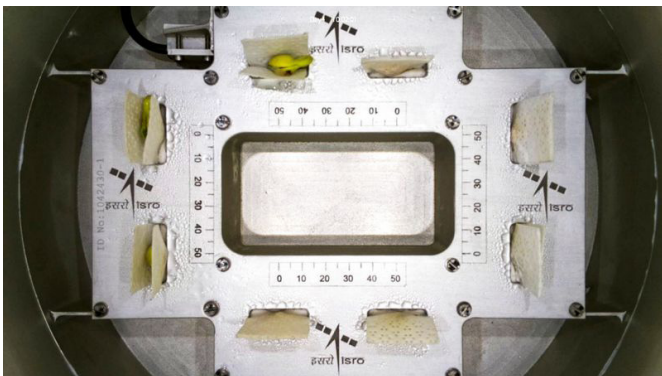
Context: On January 4, 2025, ISRO (Indian Space Research Organisation) made a significant announcement regarding the successful germination of cowpea seeds in space under microgravity conditions. The experiment, part of ISRO's CROPS (Compact Research Module for Orbital Plant Studies) mission, aims to explore how plants grow in space—critical for future long-duration missions.

About ISRO's CROPS Mission:

- The CROPS payload, developed by the Vikram Sarabhai Space Centre (VSSC), is designed to advance ISRO's capabilities for growing and sustaining plants in extraterrestrial environments.

Successful Germination in Space:

- **Launch Details:** The CROPS experiment was launched on December 30, 2024, aboard ISRO's PSLV-C60 mission.
- **Experiment Setup:** Cowpea seeds were housed in the POEM-4 platform, repurposing the PSLV rocket's fourth stage for scientific research.
- **Results:** Within four days, eight cowpea seeds sprouted leaves, demonstrating plant growth potential in space.



Significance of the CROPS Experiment:

- **Understanding Microgravity Effects:** Provides insights into how plants grow in space's unique environment.
- **Supporting Deep Space Exploration:** Insights from this experiment are crucial for long-duration missions, such as Mars, by developing sustainable life support systems.
- **Contributions to Astrobotany:** Enhances global research on growing food in space.

Future Applications:

- **Ensuring Food Security in Space:** The experiment could pave the way for sustainable agricultural systems, ensuring food for astronauts on long missions.
- **Deep Space Mission Readiness:** Research like CROPS is vital for missions to Mars and beyond.

What is the POEM-4 Platform?

- The POEM-4 (PSLV Orbital Experiment Module) is a space research platform that uses the spent fourth stage of the PSLV for microgravity experiments.
- It's part of the ISRO SpaDeX Mission and the fourth deployment of the POEM platform, with three times more capacity than POEM-3. Some of the payloads on the POEM-4 platform include:
 - » **Walking Robotic Arm (RRM-TD):** A robotic manipulator that can move in an inchworm-like motion for inspection and servicing.
 - » **Debris Capture Robotic Manipulator:** A VSSC innovation that can capture and manipulate debris to help with space clean-up.
 - » **Gradient Control Reaction Wheel Assembly (RWA):** An IISU payload that uses reaction wheels to improve the POEM platform's attitude stabilization.

What is the SpaDeX mission?

- The SpaDeX mission, launched aboard ISRO's PSLV-C60 on December 30, 2024, aims to demonstrate India's first in-space docking. The mission involves two small satellites, SDX01 (Chaser) and SDX02 (Target), which will attempt a critical docking maneuver on January 7, 2025.
- If successful, this will place India alongside the US, Russia, and China in mastering space docking technology, which is essential for future space stations, interplanetary missions, and in-orbit refueling. The success of SpaDeX marks a major milestone in India's space capabilities, laying the foundation for advanced space infrastructure.

Restricted Lists of U.S.

Context: The United States has announced a policy shift to remove Indian scientific and nuclear entities from its "restricted lists." This decision, announced by U.S. National Security Adviser Jake Sullivan, aims to unlock the

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full potential of the India-U.S. nuclear deal signed in 2005 and foster greater cooperation in civil nuclear energy and space exploration.

What is the “Restricted List”?

- The restricted list includes entities or individuals in certain countries, including India, that face trade and cooperation restrictions, particularly in nuclear, scientific, and defense sectors. These lists are created due to concerns over nuclear proliferation, misuse of technology, or national security risks, preventing U.S. entities from engaging in joint research or providing technologies.

What is the Benefit of This Removal?

- **Enhanced Nuclear Cooperation:** Indian nuclear entities can now collaborate with U.S. companies, advancing civil nuclear energy cooperation.
- **Boost to Space Cooperation:** Updates to missile export controls will enhance U.S.-India commercial space ventures.
- **Technological Advancements:** India gains access to cutting-edge U.S. technologies, fostering innovation.
- **Greater Private Sector Engagement:** More opportunities for joint research and development in nuclear and space sectors.

About the India-U.S. Relationship:

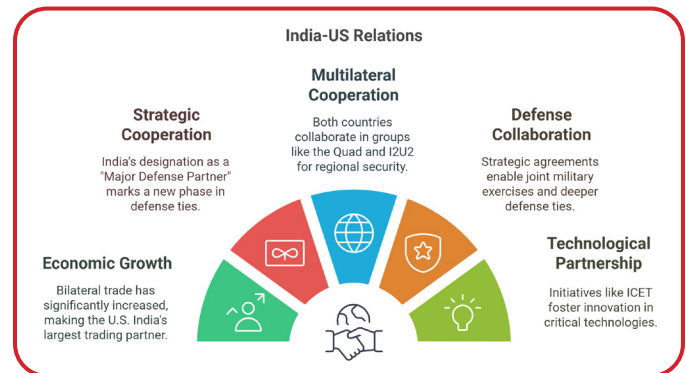
- Relations between India and the US date back to India's independence movement and have evolved significantly post-independence. Initially marked by tension during the Cold War, particularly due to the US's alliance with Pakistan and India's non-alignment stance, the relationship grew stronger after the 1990s, with increased cooperation on global security and trade.

Significance of India-US Relations:

- **Economic Growth:** The U.S. is India's largest trading partner, with bilateral trade rising by 72% from 2017-2023.
- **Strategic Cooperation:** India became a "Major Defense Partner" in 2014, marking a new phase in defense and security ties.
- **Multilateral Cooperation:** Both countries have increased collaboration in groups like the Quad and I2U2, focusing on regional security and global issues.
- **Defense Collaboration:** Strategic agreements like LEMOA and COMCASA enable joint military exercises

and deeper defense ties.

- **Technological Partnership:** Initiatives like the ICET foster innovation in critical technologies.
- **Cultural Exchange:** A strong Indian diaspora and educational exchanges strengthen mutual understanding.
- **Climate Cooperation:** Joint efforts on climate change, including the U.S.-India Clean Energy Partnership.



What challenges persist in India-US relations?

- **Trade Disputes:** Imbalances and agricultural tariffs cause friction.
- **Data Privacy:** India's emphasis on data localization conflicts with US preferences for free data flow.
- **Defense Procurement Delays:** Bureaucratic issues slow defense collaboration, such as delays in drone deals.
- **Visa and IP Disputes:** Visa restrictions and intellectual property issues remain points of contention.

Indus Valley Civilization

Context: Tamil Nadu Chief Minister M.K. Stalin has announced a \$1 million prize for those who successfully decipher the Indus Valley Civilization (IVC) script, potentially unlocking insights into one of the oldest and most enigmatic writing systems.

Reason behind Indus valley Civilization not deciphered till date:

- **Absence of multilingual inscriptions:** No bilingual or multilingual inscriptions from the Harappan period, making it difficult to compare symbols to known languages.

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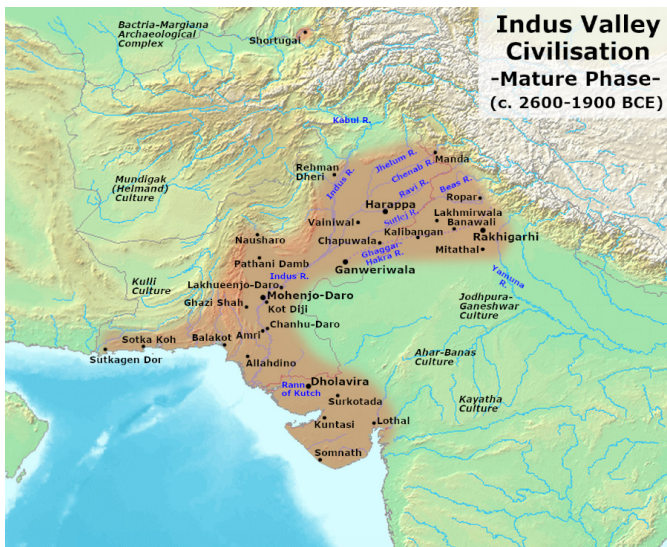


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- **Unknown language:** The Harappan script represents an undecoded language, complicating the assignment of phonetic values. Various hypotheses (Dravidian, Indo-European) lack conclusive evidence.
- **Limited material evidence:** Only around 3,500 seals with brief inscriptions, limiting the ability to identify patterns. Many potential artifacts remain buried and unexplored.
- **Lack of cultural context:** Little is known about Harappan society, making it challenging to interpret the script without understanding the civilization's culture and structures.
- **Theoretical disagreements:** Competing theories about the script's language (e.g., proto-Dravidian, Indo-European), with no consensus on its meaning.

About the Indus Valley Script:

- The Indus Script, dating back to 2600–1900 BCE, is a crucial but undecoded element of ancient history, offering clues about the socio-economic, cultural, and technological advancements of the Indus Valley Civilization.



Key Features of the Indus Script:

- **Material Use:** Inscribed on seals, pottery, tools, and tablets made of materials like steatite, bone, and copper.
- **Directionality:** Predominantly right to left, with some bidirectional writing.
- **Boustrophedon Style:** Alternating right-to-left and left-to-right writing.

- **Sign Types:** Includes logo-syllabic signs, representing whole words and phonetic sounds.
- **Numerals:** Uses a decimal system, with downward strokes for units and semicircles for tens.
- **Evolution:** Evolved from simple potter's marks to a developed writing system.

Deciphering Challenges:

- **Absence of Bilingual Inscriptions:** Lacking comparative texts, making translation difficult.
- **Short Texts:** Most inscriptions are brief, complicating pattern recognition.
- **Uncertain Linguistic Connections:** The language remains unknown, with theories suggesting links to Dravidian, Indo-European, or other languages.

Decline of the Indus Script:

- The script faded around 1800 BCE, coinciding with the decline of the Indus Valley Civilization. It was not adopted by later civilizations, contributing to its eventual loss.

Maiya Samman Yojana

Context: Recently, Jharkhand Chief Minister Hemant Soren distributed the first increased instalment of Rs 2500 to eligible women under 'Maiya Samman Yojana' in a program organised in at Khoja Toli Army Training Ground in Jharkhand's capital Ranchi.

Key Details of the scheme:

- **Financial Aid Increase:** Under the revised Maiya Samman Yojana, the amount of monthly financial assistance given to women has been increased from Rs 1,000 to Rs 2,500. This move is aimed at financially empowering women in the state.
- **Start Date:** Beneficiaries will start receiving the increased amount from December 2024.
- **Beneficiaries:** The scheme currently benefits around 50 lakh women in Jharkhand, all of whom are above the age of 18 years. With the revised amount, the financial burden on the state government is estimated to increase by Rs 9,000 crore annually.

Background on Maiya Samman Yojana:

- **Launch:** The Maiya Samman Yojana was introduced by the Jharkhand government in August 2024. It initially

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provided Rs 1,000 per month to women above the age of 18 years as part of an initiative to empower women financially.

- **Purpose:** The scheme is designed to support women in managing their household expenses and promoting financial independence, particularly for those without a regular income.

Universal Basic Income (UBI):

- Universal Basic Income (UBI) is a regular, unconditional cash transfer given to all citizens, regardless of their income or socio-economic status. The goal is to reduce poverty and inequality by offering financial security and giving people more freedom in choosing work.
- **Article 41:** Guarantees the right to work, education, and public assistance in cases of unemployment,

old age, sickness, disablement, and other cases of undeserved want

- **Advantages include:**
 - » Economic freedom
 - » Reduced corruption
 - » Equitable distribution of wealth
- However, there are challenges, such as:
 - » High fiscal costs
 - » Inflation risks
 - » Potential reduction in workforce participation
- Economic Survey 2016-17 suggests alternatives, such as targeting women or vulnerable groups, to make UBI more feasible in India.

Power Packed News

Indonesia new member of BRICS

- Brazil, the chair country of BRICS, has declared Indonesia a full member of this global organization.
- Indonesia, which has the fourth largest population in the world, expressed its interest in BRICS soon after the formation of its new government.
- BRICS was formed in 2009 by Brazil, Russia, India, and China. The first BRICS summit was held in 2009 in Yekaterinburg, Russia. In 2024, the group was expanded to include Iran, Egypt, Ethiopia, and the United Arab Emirates.
- Turkey, Azerbaijan, and Malaysia have applied for membership.
- The 16th BRICS summit was held in Kazan, Russia in 2024.
- Indonesia's membership will further strengthen the organization's global economic and political influence.



Aero India 2025, Asia's largest aero show

- The 15th edition of Aero India will be organized from 10 to 14 February 2025 at Yelahanka Air Force Station, Bengaluru. The theme of the show is "Runway to a Billion Opportunities".
- Aero India 2025 will focus on accelerating the indigenization process along with encouraging partnerships between Indian and foreign defense companies.
- The first three days will be commercial, while the last two days will be open to the general public. The show will become a platform to strengthen defence and aerospace ties between India and friendly countries.
- Starting in 1996, the event has successfully completed 14 editions. The last edition proved to be a huge success with 809 exhibitors and over seven lakh visitors.



New ultra-diffuse galaxy discovered

- Astronomers from the Indian Institute of Astrophysics have discovered a new ultra-diffuse galaxy 430 million light-years away

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from Earth in the Leo constellation.

- It is located at the tip of the longest ever tidal tail emanating from the galaxy NGC 3785.
- The tidal tail is a long linear cluster of stars and gas, which gives clues to the formation of ultra-diffuse galaxies.
- Onkar Bait was the first to spot the feature of this structure. The gravitational interaction between NGC 3785 and a neighbouring galaxy gave birth to this galaxy.
- This discovery will help in understanding the mysteries of the formation of UDGs, which has been a major area of study for astronomers.

Anahat Singh wins British Junior Open

- India's Anahat Singh won the Under-17 Girls' Singles title at the British Junior Open 2025. She defeated Malika El Karaxi of Egypt 3-2.
- This is Anahat's third British Open title, having previously won the Under-11 in 2019 and the Under-15 category in 2023.
- She defeated Ruqayya Salem 3-1 in the semi-finals and Nadia Tamer in the quarter-finals. The 16-year-old Anahat won nine PSA Challenger titles last year, the most by any female player.
- This achievement further cements her status as the rising star of squash in India.



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