

Cannabis & Antimicrobial resistance

- Cannabis has the potential to make a dent in India's fight against the escalating threat of antibiotic resistance.
- Scientists at CSIR Indian Institute of Integrative Medicine (IIIM), Jammu, have found that phytocannabinoids, a class of compounds found in the cannabis plant, possess some hitherto unexplored antibiotic properties.
- Antimicrobial resistance (AMR) is a major health concern worldwide.
- It refers to when bacteria, viruses, fungi, and parasites no longer respond to medicines used to treat them.
- According to Sanghapal D. Sawant, a senior principal scientist at the CSIR - National Chemical Laboratory (NCL), Pune, bacteria have developed certain sophisticated 'shields' over many decades to resist the effects of antibiotic medications.
- These include the **formation of biofilms** thin sheets of bacterial colonies that are more resistant to antibiotics than when separated and cellular mechanisms called efflux pumps that flush drugs out from cells.

- The resulting AMR increases the risk of disease spread, severe illness, and death.

What is India's AMR burden?

- According to one estimate, India reported 2.97 lakh deaths in 2019 that could be attributed to AMR and 10.42 lakh others that could be associated with AMR. Reports have also flagged the overuse of antibiotics in India, their misuse in animal husbandry, and poor waste disposal for engendering AMR and potentially rendering India the "AMR capital of the world".
- For these reasons, medical researchers are keen to tamp down AMR and find new drugs that fight AMR pathogens.
- In the new study, published in the journal ACS Infectious Diseases, IIIM researchers tested the antibacterial properties of tetra hydro cannabidiol (THCBD), a semisynthetic phytocannabinoid, against Staphylococcus aureus, the bacteria responsible for the second most number of deaths due to AMR worldwide.

Need for 'alternative solutions'

- Antibiotics are chemical compounds isolated from one microorganism and used to kill another.

- They have saved millions of lives since their discovery but are falling short against AMR bacteria.
- “S. aureus includes a strain known as MRSA, for methicillin resistant S. aureus, resistant to the last line of antibiotics called methicillin,”.
- The study revealed THCBD obtained from cannabis could fight MRSA.

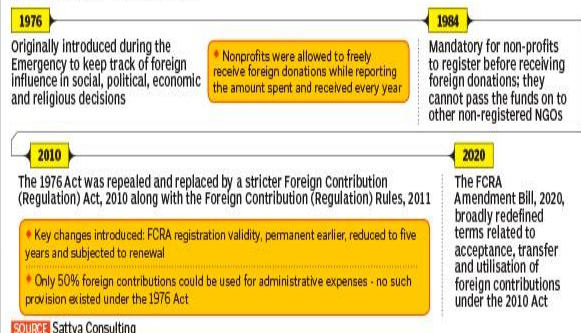
How is THCBD made?

- Cannabinoids are a class of compounds found in the cannabis plant. The researchers extracted cannabidiol from a cannabis plant and made it react with hydrogen, using palladium as a catalyst.
- This process yielded a mixture of molecules with the same composition and order of atoms but different structures. One of them was THCBD.

The Hindu

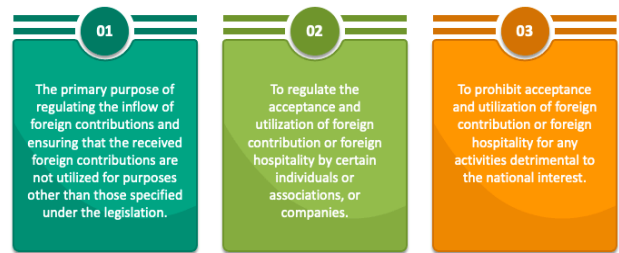
FCRA

The FCRA Timeline



FOREIGN CONTRIBUTION REGULATION ACT

Purpose of FCRA



What Changes Now?

- ◆ **Public sector employees** are forbidden to receive foreign contributions
- ◆ **Transfer of funds** received under FCRA to other individuals or organisations prohibited
- ◆ **Quantum of administrative expenses** eligible to be funded by FCRA funds lowered from 50% to 20%
- ◆ **Providing Aadhaar number mandatory** for all office bearers, directors or key functionaries of organisations
- ◆ **Powers to suspend FCRA registration** of NGOs for more than 180 days vested on the government
- ◆ **Renewal of registration** after the five-year tenure will involve same level of scrutiny as new applicants
- ◆ **Designated FCRA account** has to be mandatorily created with State Bank of India (SBI), Delhi
- ◆ **Voluntary surrendering of FCRA certificate** option available to nonprofits

- The Foreign Contribution Regulation Act, 2010 (FCRA) registration of two prominent non-governmental organizations (NGOs) Centre for Policy Research (CPR) and World Vision India (WVI) have been cancelled this month.

Who monitors the process?

- The Union Ministry of Home Affairs (MHA) monitors the implementation of the FCRA.

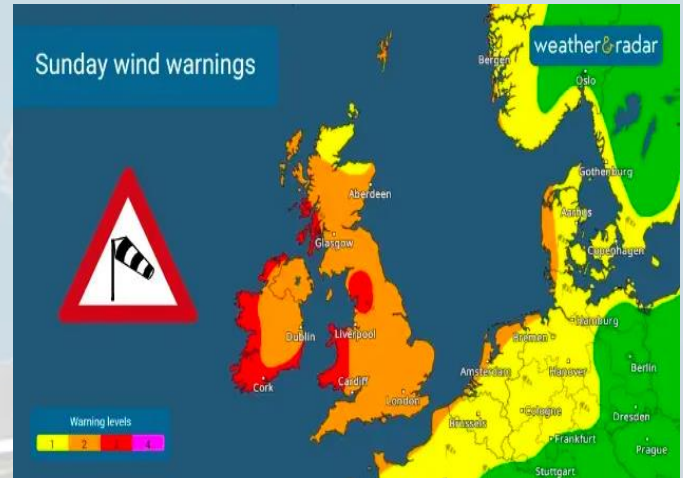
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- The registration of thousands of NGOs was due for renewal in 2020-2021.
- Due to the COVID-19 pandemic and the amendments to the FCRA Act in 2020, many NGOs could not complete the process.
- Through the FCRA, the ministry regulates foreign donations to ensure that such funds do not adversely affect the country's internal security.
- It is compulsory to register under the Act, first enacted in 1976, if an association, group or NGO intends to receive foreign donations.
- The 1976 Act was repealed and replaced with a new legislation in 201. It was further amended in 2020.
- The registration is valid for five years, after which the NGO has to apply for a renewal. It is mandatory for all such NGOs to register under the FCRA, initially valid for five years that can be renewed if it complies with all norms.

Why so many cyclones in UK?

- Tens of thousands of people across the U.K. and Ireland were without power on Monday after Storm Isha lashed the countries with strong winds and heavy rain, disrupting travel networks.

- Gusts of 159 kmph were recorded in northeast England as the whole of the U.K. was subject to weather warnings for its ninth named storm since September.



Why are storms named?

- In the UK, a storm is given a name when it has the potential to cause disruption or damage as a result of strong winds, heavy rainfall or snow, leading to amber or red weather warnings being issued.
- The UK storm season begins at the end of the summer in September and ends in August the following year.
- In Europe there are three storm naming groups, and each September there is a new alphabetical list of names issued for the upcoming storm season.
- In Western Europe the list is created by the Met Office in collaboration

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with the Irish and Dutch weather services.

- This coincides with when we expect to experience extreme storms, due to low pressure weather systems that occur in the autumn and winter months.
- Storms can impact many countries at once, and to avoid confusion, the UK adopts a storm name if another European weather service has already named it.

What causes extreme storms in the UK?

- Wind is the movement of air in our atmosphere. Air is forced to move by differences in atmospheric pressure, and the Earth's rotation means that the wind circulates around areas of lower pressure, known as a cyclone. If there is a greater difference in pressure, this causes stronger winds around the cyclone.
- Storms often bring heavy rainfall that may lead to flooding. Storms move moisture around the atmosphere, which forces warm and moist air to rise.
- Wherever the warm, moist air rises, clouds are formed. The formation of clouds also releases energy which can further intensify the storm.

- The UK is renowned for being stormy, but why?

- The jet stream a core of strong winds around 8-11 km above the Earth's surface, blowing from west to east directs weather systems, such as storms, across the Atlantic to the UK.

Will extreme storms become more intense and frequent?

- Links between human-caused global warming and storms should be expected.
- A warming atmosphere is linked with heavier rainfall because the air is able to hold more moisture which leads to clouds containing a greater number of larger raindrops.
- As the climate continues to warm, the effect will increase, and storms with heavy rain are expected to become more common.
- Additionally, the extra release of energy by clouds will likely lead to an increased rate of storms that rapidly intensify and a strengthening of the most extreme storms.
- But while a warmer world is likely making the most extreme storms more intense, the change in the overall number of storms is more uncertain and remains a subject of ongoing scientific research.

What are sting jets?

- “Sting jets are narrow jets of air that accelerate as they descend and that can cause extremely strong and damaging surface winds in a relatively small area of the storm, “
- “They are called sting jets as they descend from the tip of the hooked cloud that gradually wraps around the area of low pressure at the center of the storm. The presence of a sting jet can make intense storms, with strong surface winds, even more damaging.”

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Polar vortex and cold US climate

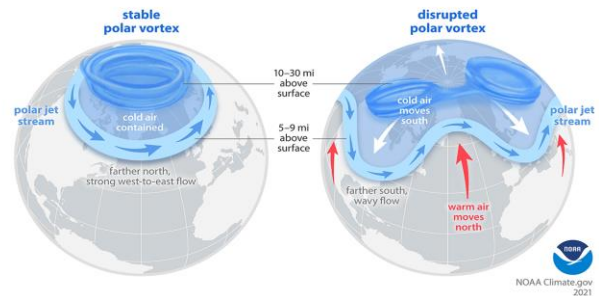
- The polar vortex is a low pressure area a wide expanse of swirling cold air that is parked in polar regions.
- During winter, the polar vortex at the North Pole expands, sending cold air southward.
- This happens fairly regularly and is often associated with outbreaks of cold temperatures in the United States.

Understanding the polar vortex

The Arctic polar vortex is a strong band of winds in the stratosphere, surrounding the North Pole 10–30 miles above the surface.

The polar vortex is far above and typically does not interact with the polar jet stream, the flow of winds in the troposphere 5–9 miles above the surface. But when the polar vortex is especially strong and stable, the jet stream stays farther north and has fewer “kinks.” This keeps cold air contained over the Arctic and the mid-latitudes warmer than usual.

Every other year or so, the Arctic polar vortex dramatically weakens. The vortex can be pushed off the pole or split into two. Sometimes the polar jet stream mirrors this stratospheric upheaval, becoming weaker or wavy. At the surface, cold air is pushed southward to the mid-latitudes, and warm air is drawn up into the Arctic.



How can the polar vortex cause extremely cold temperatures in the US?

- Sometimes this low-pressure system, full of arctic air, can weaken and travel from its usual position.
- As this system weakens, some of the cold, arctic air can break off and migrate south, bringing plenty of cold air with it.
- Areas as far south as Florida may experience arctic weather as a result.
- When the low-pressure system is strong and healthy, it keeps the [jet stream](#) traveling around Earth in a circular path.
- The jet stream is a band of reliably strong wind that plays a key role in keeping colder air north and warmer air south.

The Hindu

Tax distribution between states

- The Finance Commission's important job is to recommend a distribution formula specifying each State's share in the part of the Union tax revenue assigned to States.
- Such distribution formulas have a few weighted determinants.
- Since the 1st Finance Commission, some States have been arguing that their contributions to the Union tax revenue have been higher than others and, therefore, they rightfully have higher shares in the Union tax revenue.

Equity, efficiency in tax revenue transfers

- Two important tasks of the Finance Commissions are (i) to recommend the proportion of the Union tax revenues to be assigned to States and (ii) to recommend the share of each State in the assigned tax revenue.
- Till 2000, that is, the 10th Finance Commission, the States' share was restricted only to personal income tax and Union excise duties and after that, all the Central tax revenues were pooled, and States' shares were decided.
- With reference to the second task, the Finance Commission devises a distribution formula to arrive at a

share for each State, and it is based on the principles of equity and efficiency.

- Equity stipulates that the revenue scarce States and States with higher expenditures get larger shares of Union tax revenue than others.
- Efficiency is to reward the States that are efficient in collecting revenue and rationalising spending.
- The tradeoff between equity and efficiency is normative and remains dynamic in successive Finance Commission recommendations.
- States from which large volumes of income tax revenue have been collected argued to consider and assign a higher weight to 'tax collection' as an indicator of tax contribution.
- We should note that tax contribution is an efficiency indicator because a State's level of development and economic structure decides its tax contribution.
- However, Finance Commissions had assigned only 10% to 20% weight to this efficiency indicator.
- Population, a chief indicator of the expenditure needs of the State, was given 80% to 90% weight in the first seven Finance Commissions as far as

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income tax distribution was concerned.

- In the case of distributing revenue from Union excise duties, the entire distribution was based on population or other indicators of expenditure needs such as area, per capita income, the proportion of Scheduled Caste/Scheduled Tribe population, and some indicators of social and physical infrastructure needs.
- Since the 10th Finance Commission, the Commission has recommended a single distribution formula for both income tax and Union excise duties.
- Thus, the Finance Commissions have always favoured assigning more than 75% weight to equity indicators.
- Since 2000, the formula for the distribution of pooled Central tax revenues included tax effort and fiscal discipline as efficiency indicators with a weight of around 15%. Tax effort is broadly defined as the ratio of own revenue of a State to its Gross Domestic Product.
- Fiscal discipline is the proportion of own revenue to the revenue expenditure of a State.
- In the 15th Finance Commission, the distribution formula had tax effort with a weight of 2.5%, and demographic performance, an

indicator of efficiency in population control, was given a weight of 12.5%.

- The remaining 85% weight was distributed among equity indicators of per capita income, population as per the 2011 Census instead of the conventional 1971 Census, area, forest cover, etc...
- The two relative contributions, namely GST revenue and petroleum consumption, of States are fair and accurate measures of States' contributions to the national exchequer and a good measure of efficiency.
- There is a persuasive case for the 16th Finance Commission, recently constituted by the Union government, to debate and include these ratios as a measure of efficiency with a weightage of at least 33% in the distribution formula.

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Energy transition and coal

- First, managing thermal plant outages better during peak demand periods.
- In 2023, ~38 GW of coal-based power plants across India witnessed unplanned outages or were not called on to generate power during the top 10% peak demand days.

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- Improved availability and utilization of existing plants can mitigate the need for investments in new(er) thermal assets to meet peak power demand in the medium term.
- This will require power utilities to forecast demand better to anticipate outages, plan maintenance and keep plants online during peak days.
- Second, increasing the flexibility of the existing coal fleet.
- To seamlessly integrate more renewable energy (RE) into the grid, thermal plants that typically produce a steady load of power must learn to follow the vagaries of the wind and the sun.
- This can be done by making our existing coal plants more flexible reducing their minimum power load and improving ramp rate capabilities.
- Third, incentivizing payment for storage services beyond the supply of energy units.
- When RE has to contribute significantly to our demand, energy storage systems will have to support the power grid during hours when renewables are not available.
- Fourth, indigenizing supply chains for battery storage and RE technologies.
- Being the lifeline of the power system, the coal economy is an important source of domestic value addition, job creation, and furthering India's 'Atmanirbhar' aspirations.
- While the attention on the global stage focuses solely on decarbonization, domestic energy security will drive policymaker focus and investments in India.
- With falling renewable energy and storage prices, decision makers need a transparent assessment of the long term opportunity costs of locking ourselves into conventional power sources to meet near-term needs.
- They must prioritise affordable electricity for all segments of the economy.

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