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TATHASTU

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Cumin (Jeera)

News: Sky-rocketing Jeera prices in India are in the news recently.

Background:

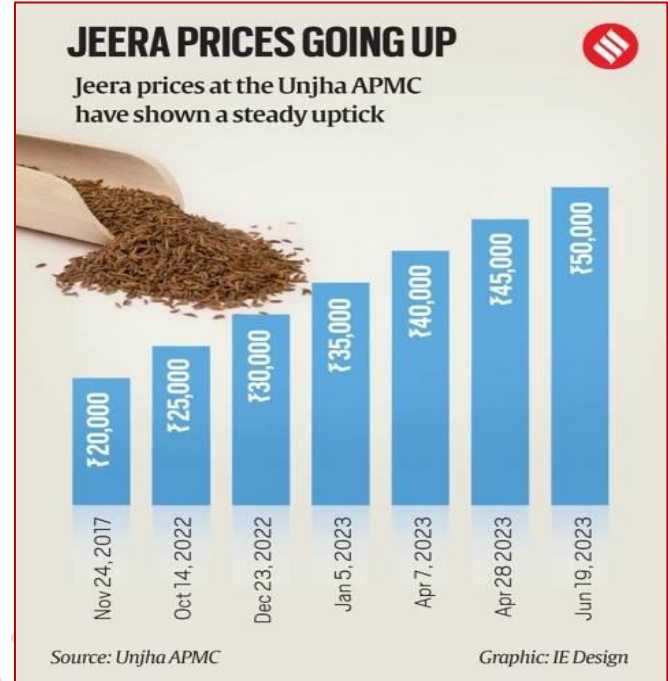
- **Unjha, Gujarat** is the **largest wholesale market** for Jeera.
- Factors such as **Demand-supply mismatch, lower domestic production** and **deliberate mismanagement** on the supply side are considered to be reasons for driving up Jeera prices.
- From an exam perspective, we will read about climatic conditions and soil type required for the growth of Jeera.

What is Cumin/Jeera?

- Cumin is a spice made from the seeds of the *Cuminum cyminum* plant. It has a distinctive flavour that is earthy, nutty, spicy and warm.
- Cumin is also rich in iron and contains many beneficial plant compounds that have antioxidant properties.
- Cumin has been used for centuries in traditional medicine to treat various conditions, such as indigestion, irritable bowel syndrome, infections, diabetes and high cholesterol.
- India produces more than **70%** of the world's cumin. Jeera is grown on about 8 lakh hectares area in India. Other countries include Syria, Turkey, UAE, and Iran.
- Out of the total 7.25 lt production in 2021-22, two states – **Gujarat** (4.20 lt) and **Rajasthan** (3.03 lt) – had a combined **99.7% share**.

What are climatic conditions essential for Cumin to grow?

- Cumin is a weather-sensitive crop. It grows well in **moderate dry** and **cooler climates** and a subtropical climate is ideal for cumin cultivation.
- It can tolerate frost and drought to some extent. Cumin requires **low atmospheric humidity** and **mild winters**.
- Frequent rains at the time of flowering, fruit set, and maturity can lead to diseases in the crop.
- Cumin can be grown on different types of soils, but the most suitable are **sandy soils with low organic matter** and **clay or clay loam** with fair organic matter.



Semiconductors

News: The government on Friday said that the first Made-in-India semiconductor chips are expected to be rolled out by December 2024.

Background:

- American Micron company will invest \$2.75 Billion in semiconductor assembly and test facilities in India.
- Around 60,000 Indian engineers will be trained by Lam Research.
- Overall investments are expected to generate 80,000 jobs in the semiconductor industry.

What are semiconductors?

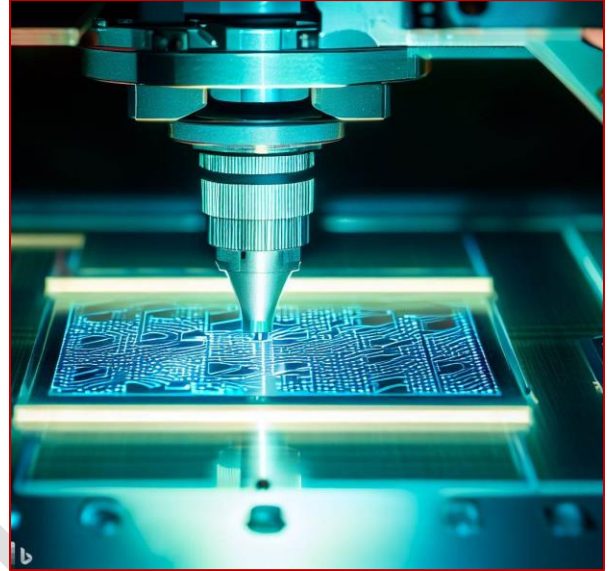
- A semiconductor is a material that has a conductivity between that of an insulator and that of a conductor. In simple words, they are the building blocks of all electronic devices.

- Some examples of semiconductors are silicon, germanium, gallium arsenide, and tin. Silicon is the most widely used semiconductor material because of its abundance, low cost, and favourable electrical properties.

What are the applications of semiconductors?

Semiconductors are an **essential component of electronic devices**, enabling advances in **communications, computing, healthcare, military systems, transportation, clean energy**, and countless other applications.

- **Consumer electronics** - Mobile phones, laptops, microwaves, refrigerators.
- **Solar technology** - Solar cells or photovoltaic cells are made of semiconductor materials such as silicon or gallium arsenide that convert sunlight into electricity.
- **Biomedical engineering** - Semiconductor devices such as biosensors, microfluidic chips, and implantable devices are used for monitoring, diagnosing, and treating various medical conditions.
- **Automotive industry** - Semiconductor devices such as microcontrollers, sensors, power modules, and radar systems are used for enhancing the performance, safety, and efficiency of vehicles. They have applications in engine control, anti-lock braking systems, airbags, navigation systems, and autonomous driving.
- **Aerospace and defence** - Semiconductor devices such as microprocessors, memory chips, radio-frequency modules, and infrared detectors are used for enabling various functions of aircraft, satellites, rockets, missiles, and radars.



What are the challenges in semiconductor manufacturing faced by India?

- **High capital investment** - Semiconductor manufacturing requires huge investments in setting up and maintaining state-of-the-art fabrication units (fabs) and equipment. The cost of building a fab can range from \$5 billion to \$20 billion, depending on the technology and capacity.
- **Lack of infrastructure** - Semiconductor manufacturing requires a reliable and uninterrupted supply of power, water, gas, and chemicals, as well as efficient transport and logistics systems. India suffers from frequent power outages, water scarcity, poor road connectivity, and customs delays that can hamper the smooth operation of fabs.
- **Lack of skilled manpower** - India has a shortage of talent in domains such as design, fabrication, testing and quality control.
- **Lack of ecosystem** - Semiconductor manufacturing depends on a vibrant ecosystem of suppliers, vendors, customers, research institutions, and industry associations that can support the entire value chain from design to delivery. India lacks such an ecosystem and has to rely on imports for most of the raw materials, equipment, components, and services required for semiconductor production.
- **Competition** faced from Global hubs of semiconductor manufacturing (China, Taiwan, South Korea) and lack of large and stable domestic demand to ensure economies of scale.

What are initiatives taken by the Government of India in this context?

- The Government of India has recently launched the **Semicon India Program** (Program for Development of Semiconductors and Display Manufacturing Ecosystem in India), with an outlay of INR 760 billion.
- The **Design Linked Incentive (DLI)** scheme for **promoting domestic chip design and innovation in the semiconductor sector**.
- To drive the **long-term strategies** for developing sustainable semiconductors and display ecosystems, a specialized and independent **India Semiconductor Mission (ISM)** has been set up. The mission will be led by global experts in the semiconductor and display industry and will integrate different stakeholders in the country.

- India has signed a **memorandum of understanding (MoU) with Taiwan** for cooperation in the electronics and IT sectors, including semiconductor manufacturing.
- Recent agreements made in the United States on PM Modi's official state visit.

Precision Fermentation

News: According to many, precision fermentation can disrupt the food system as we know it, cutting emissions, land, and freshwater use. But what is it?

What is Precision Fermentation?

- Precision fermentation is a cutting-edge technology that **combines traditional fermentation methods with precision biology techniques**. It involves **programming microorganisms**, such as yeast, to produce specific proteins by inserting genetic instructions or DNA sequences into their cells.
- The microorganisms then act as highly efficient factories that consume specific inputs and spit out desired outputs.
- Precision fermentation can be used to produce a variety of products, such as **enzymes, fats, vitamins, flavouring agents, natural pigments, and alternative proteins**.

What are some examples of products made by Precision fermentation?

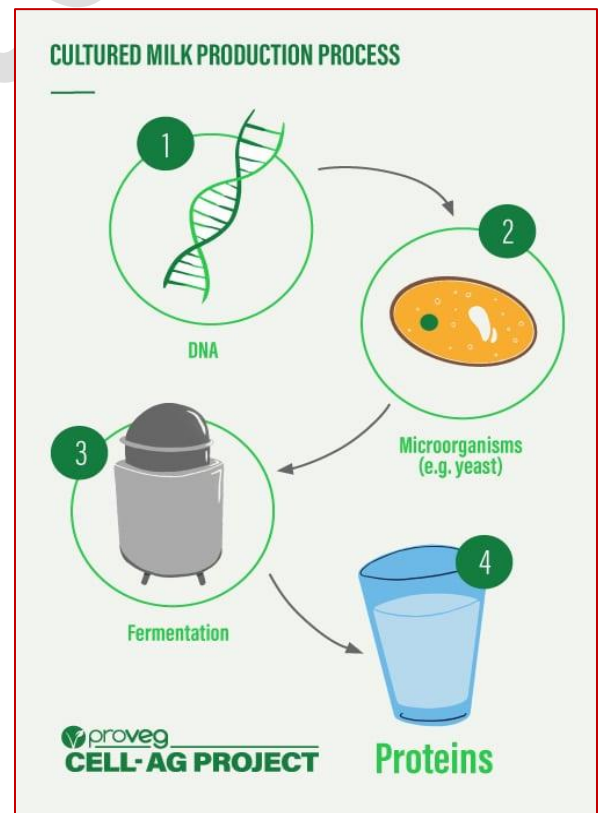
- **Animal-free dairy ingredients**, such as milk protein, animal fats, and collagen.
- **Egg whites**, created by yeast are modified to produce the same proteins as chicken eggs.
- **Vitamins**, such as vitamin B12, which can be synthesized by bacteria that are optimized to produce high yields of the essential nutrient.

What are the advantages of Precision Fermentation?

- It is **quicker and easier to scale** than livestock farming or traditional agriculture, as it does not require large amounts of land, water, feed, or other resources.
- It can **improve food security and nutrition**, as it can provide a reliable and affordable source of protein and other essential nutrients for the growing population.
- It can **reduce the environmental impact of food production**, as it emits less greenhouse gases, consumes less energy, and generates less waste than animal-based or plant-based alternatives.
- Precision fermentation allows for the production of **animal-free proteins**, eliminating the need for raising and slaughtering animals.
- It can be **implemented in any part of the world** using local biomass sources, such as sugar cane, corn, or algae, as inputs for the fermentation process.

What are the concerns?

- At the moment, the **technologies are expensive** which will make the products look more expensive compared to conventional ones.
- As Advanced fermentation technologies involve genetic engineering and the use of genetically modified organisms (GMOs), there are **regulatory and safety considerations**.
- It has the **potential to disrupt** the traditional agricultural sector.



- Precision fermentation products may encounter **consumer resistance or scepticism**, as they may be perceived as unnatural, artificial, or unfamiliar.

Facts for Prelims

Biodegradable paper Supercapacitor

News: Scientists at Gujarat Energy Research and Management Institute (GERMI) have developed the thinnest, lightweight and biodegradable paper-based supercapacitor.

What is a supercapacitor?

- A supercapacitor is an **electrochemical charge storage device** with a **fast charging/discharging cycle, high power density and a longer life cycle**.
- They are used in power-smoothing, pitch-control, start-stop, regenerative-braking, smart-grid, active heave compensation, and speciality UPS applications.

How did the scientists develop a biodegradable paper supercapacitor?

- Scientists have developed a supercapacitor from seaweed (marine macroalgae). This supercapacitor can fully charge a device within 10 seconds.
- The device is of high tensile strength and performance, as well as cost-effective, according to the researchers.
- The product can be used in electronics, memory backup systems, airbags, heavy machines, electric vehicles, etc.; hence, it holds a huge business prospect.

About GERMI:

- It is a **centre of excellence in the energy sector**, promoted by **Gujarat State Petroleum Corporation Limited (GSPC)**, a Government of Gujarat Undertaking.
- GERMI is based in Gandhinagar, India, and it is a recognized Scientific and Industrial Research Organization (SIRO) by the Department of Scientific and Industrial Research (DSIR), Government of India.

Indus-X

News: The US Department of Defence (DoD) and the Ministry of Defense launched the India-US Defense Acceleration Ecosystem (INDUS-X).

What is Indus-X?

- It is an initiative to expand the strategic technology partnership and defence industrial cooperation between India and the U.S. governments, businesses, and academic institutions.
- INDUS-X will focus on advancing high-tech cooperation and fostering joint research, development, and production opportunities in the defence sector. The initiative aims to explore possibilities for co-producing jet engines, long-range artillery, and infantry vehicles.
- INDUS-X will also connect U.S. and Indian defence start-ups as part of the U.S.-India initiative on Critical and Emerging Technology (CET)
- INDUS-X will be led by **India's Innovations for Defense Excellence (iDEX)** and the **Office of the Secretary of Defense (OSD)** for MoD and DoD, respectively.



Sylvester Da Cunha

News: Sylvester daCunha, the creative genius behind the iconic 'Amul Girl' campaign, passed away on 20th June.

About:

- Sylvester daCunha, along with his wife Nisha, conceptualized the famous '**Utterly Butterly**' campaign for Amul in 1966, which introduced the world to the endearing 'Amul Girl.' This campaign, with its witty and timely messages, became an instant hit and continues to captivate audiences to this day.

Some life lessons that we can learn from him are as follows:

- Being creative and witty and having the courage to innovate and change the norms.
- He was **versatile and adaptable** in his skills and interests. He was not only an advertising professional, but also a theatre personality, an actor, a director, and a producer.
- He was **socially aware and responsible** in his work. He used his platform and influence to **raise awareness** and **comment on various social issues and events**.



Places in News

Borealis Mud Volcano

News: Recently, Geologists have discovered a never-before-seen volcano at the **bottom of the Barents Sea off the coast of Norway**, which is erupting with mud, fluids, and gas from the planet's interior. The volcano has been named The Borealis Mud Volcano.

About:

- A Borealis mud volcano is a **rare underwater geological structure** that spews out mud and methane gas from deep below the Earth's crust. It is located in the Barents Sea, south of Norway's Bear Island.

- It is only the second mud volcano discovered in Norwegian waters. The other one is the **Håkon Mosby volcano**.
- It was discovered using a remote-controlled underwater vehicle named **ROV Aurora**. The vehicle was launched from an icebreaker polar research vessel called **RV Kronprins Haakon**.

Amchang Wildlife Sanctuary

News: For peaceful co-existence with wild elephants, the Indian army has generated a unique ecosystem in the Amchang wildlife sanctuary. It has the aim to mitigate the human-elephant conflict in the Sanctuary.

About:

- Amchang Wildlife Sanctuary is a wildlife sanctuary located on the eastern fringe of **Guwahati, Assam, India**.
- Fauna – Elephant, Chinese pangolin, Assamese macaque etc
- Amchang's habitat is dominated by tropical moist deciduous forests with semi-evergreen forests in depressions and river valleys.