India's first Biotech Startup Expo 2022

For Prelims: India's first Biotech Startup Expo 2022, Biotechnology

For Mains: Potential of Biotech Sector and Associated Challenges

Why in News?

Recently, Prime Minister has inaugurated the **Biotech Startup Expo - 2022.**

- It is a **reflection of the expansive growth of the biotech sector** in the country.

What are the Key Highlights of the Expo?

- **About:**
  - The Biotech Startup Expo 2022 will provide **a common platform to connect investors, entrepreneurs, scientists, researchers, industry leaders, manufacturers, bio-incubators, regulators and government officials.**
  - The expo is being organised by the Department of **Biotechnology and Biotechnology Industry Research Assistance Council (BIRAC)** to mark the completion of ten years of BIRAC.
  - It will showcase **applications of biotechnology in various fields** including healthcare, agriculture, genomics, clean energy, biopharma, industrial biotechnology and waste-to-value.
- **Theme:** 'Biotech Startup Innovations: Towards AatmaNirbhar Bharat'.

What is Biotechnology and its Application?

- Biotechnology is **technology that utilizes biological systems**, living organisms or parts of this to develop or create different products.
- Brewing and baking bread are examples of processes that fall within the concept of biotechnology (use of yeast (= living organism) to produce the desired product).
  - Such traditional processes usually utilize the living organisms in their natural form (or further developed by breeding), while the more modern form of biotechnology will generally involve a more advanced modification of the biological system or organism.
- Biotechnology deals with **industrial scale production of biopharmaceuticals and biologicals using genetically modified microbes**, fungi, plants and animals.
- The applications of biotechnology include **therapeutics, diagnostics, genetically modified crops for agriculture, processed food, bioremediation, waste treatment, and energy production.**

What is the Status of Biotech Sector?

- **About:**
  - India is among the **top 12 destinations for biotechnology globally and 3rd largest biotechnology destination** in the Asia Pacific region.
  - The country is **also the world's third-largest producer of recombinant** Hepatitis B **vaccine** and second-largest producer of **BT cotton** (genetically modified pest resistant plant cotton).
  - India's Biotech sector is **categorised into Biopharmaceuticals, BioIndustrial, Bioagriculture, BioIT & BioServices.**
  - Within bio-services, **India offers a strong capability in contract manufacturing, research and clinical trials,** and is home to the most US FDA approved plants globally outside of the US.
- **Statistics:**
  - The Indian bioeconomy **grew from USD 62.5 billion in 2019 to USD 70.2 billion in 2020** at a growth rate of 12.3%.
  - The Indian biotechnology industry, which stood at USD 63 billion in 2019, is expected to reach USD 150 billion by 2025, with a **CAGR (Compound Annual Growth Rate)** of 16.4%.
    - By 2025, the contribution of the Indian biotechnology industry to the global biotechnology market is expected to grow to 19%.
  - As of 2021, **India's biotech industry clocks in about USD 12 billion in annual revenue.**
- **Potential of Biotechnology:**
  - **Multi-Faceted Domain:** Biotechnology is a multi-faceted domain encompassing **applications in agriculture**, **pharmaceuticals**, **scientific discoveries, etc.** The biotech sector can be broadly divided into five major segments:
    - Biopharma
    - Bio-agriculture
    - Bio-services
    - Bio-industrial Applications
    - Bioinformatic
  - **Growing Biotech Start-ups**: As one of India's pioneering achievements in biotechnology, the sector employs the best minds and contributes to the development of **generic and affordable medicines.**
    - Currently, there are over 2,700 biotech start-ups and are expected to touch the 10,000-mark by 2024.
  - **Role of BIRAC:** Biotechnology Industry Research Assistance Council (BIRAC), established under the Department of Biotechnology in 2012, continues to play a crucial role in the development of the biotech sector in India.
    - **BIRAC brings innovators and funders on to a common table**, enabling ideas to become a reality and facilitate technological advances that make human progress possible.
  - **Other Factors:**
    - India is seen as **a potential land of opportunity by the biotech sector.**
    - These factors include a **diverse population, diverse climates, a talented workforce, initiatives to relax corporate regulations and a growing demand for bio goods.**
- **Associated Challenges:**
  - **Structural Issues:** Considering that manufacturing in the biopharma sector is capital intensive, such investments have been suboptimal in India **due to limited access to capital, inadequate infrastructure and complex and ever-evolving regulatory framework.**
    - As Biotechnology products and solutions **often require ethical and regulatory clearance, making the process long, expensive and cumbersome.**
    - Further, **low remuneration of scientists (compared to the developed economies) and a few institutional research bases** have not helped create more jobs in biotechnology.
  - **Heavily Public Sector Dominated:** Compared to the developed economies (the United States), biotechnology research in **India is mainly funded by the public exchequer.**
    - Unless the **private sector starts supporting applied research and engages**

with academic institutions, the innovation in applied and translational biotechnology will be minimal.

- **Lack of Innovation:** In terms of innovation, entrepreneurship, and technology creation, **the biotechnology sector requires years of experience in the domain, access to labs with sophisticated instruments, sustained and long-term funding to innovate.**
  - However, India has not done well enough in improving innovation culture.

What are the Related Initiatives?

- **UNATI Atal Jai Anusandhan Mission Programmes.**
- **Biotechnology Parks and Incubators.**
- **National Biopharma mission**
- **'UMMID' initiative**
- **Genome India**
- **LOTUS HR project**
- **Biotech-KISAN**

Way Forward

- Given the long history of diseases in India, the country has accumulated years of experience and scientific knowledge to prevent and treat them. India is working to boost the biotechnology sector under various flagship programmes such as **'Make in India' and 'Start-up India'.**
- Increase in the number of biotech incubators **will boost research and promote growth of start-ups**, which is critical for the success of the Indian biotech industry.
- The **favourable location of the biotech hubs will depend on critical factors** like research and technology development competence, market, industry policies, infrastructure, investments.
  - Setting up the integrated biotech hubs will facilitate **Foreign Direct Investments (FDIs)**, build the confidence of investors, enhance Indian export potential for quality products, boost in-house capacity towards import substitution, and nurture and support innovations to generate more IP for India.

UPSC Civil Services Examination Previous Year Question

Q. Mycorrhizal biotechnology has been used in rehabilitating degraded sites because mycorrhiza enables the plants to (2013)

1. resist drought and increase absorptive area
2. tolerate extremes of pH
3. resist disease infestation

Select the correct answer using the codes given below:

(a) 1 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (d)

Exp:

- Mycorrhiza: It is a symbiotic association between a fungus and a plant. The term 'mycorrhiza' refers to the role of the fungus in the plant's rhizosphere, its root system. Mycorrhiza plays important roles in plant nutrition, soil biology and soil chemistry.

- Mycorrhizal biotechnology improves plant growth and survival in soils contaminated by heavy metals. It enables in:
    - Increasing the efficiency of nutrient and water uptake.
    - Enhancing the plant's capacity to tolerate extremes of pH. Hence, 2 is correct.
    - Enhancing resistance to pathogens. Hence, 3 is correct.
- Buffering plant species against several environmental stresses and drought resistance. Hence, 1 is correct. Therefore, option (d) is the correct answer.

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