



Mains Practice Question

Q. What factors have contributed to the growing activity in biotechnology in India, and how has this development benefited the biopharmaceutical sector? **(250 Words)**

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Approach

- Start with introducing biotechnology in India, highlighting its recent growth and significance.
- Identify key factors driving the growth of biotechnology, and explain the benefits to the biopharmaceutical sector.
- Conclude by summarizing the role of biotechnology in India's healthcare evolution.

Introduction

India's biotechnology sector has seen remarkable growth, expanding from **USD 10 billion in 2014 to USD 130 billion in 2024**. This surge has been fueled by advancements in key technological research. The sector has notably strengthened the biopharmaceutical industry, elevating India's stature in global healthcare innovation.

Body

Factors Contributing to the Growth of Biotechnology in India:

- **Private Sector Investment:** India's progress in **R&D** within biotechnology, especially in **genetic engineering, vaccines, and biological drug formulations**, has resulted in cutting-edge **innovations** that meet both domestic and global needs.
 - E.g; **COVID-19 vaccines** and **Nafithromycin** are examples of these breakthroughs.
- **Institutional Support and Policies:** The Indian has made significant investments in **biotechnology** through initiatives like the **Biotechnology Industry Research Assistance Council (BIRAC)**, **BioE3 Policy**, and the **National Biotechnology Development Strategy** to provide funding, research incentives, and an environment for innovation.
 - Biotechnology is recognized as a **sunrise sector**, playing a crucial role in India's ambition to become a USD 5 trillion economy by 2024.
- **Improved Global Market Access:** With about **3% of the global biotechnology market** share, India is becoming a hub for delivering innovative and affordable healthcare solutions.
 - The country has emerged as a leader in the **generic drug market**.
- **Skilled Workforce and Research Facilities:** India has a **large pool of skilled talent** in the biotechnology field, supported by strong **academic institutions** such as **IITs, and CSIR**, and various biotech-focused institutions (**SII**).
 - The collaboration between **industry** and **academia** has fostered a conducive environment for **biotechnological innovation**.

Benefits of Biotechnology Advancement in the Biopharmaceutical Sector:

- **India's Global Pharma Footprint:** India has strengthened its position in global biomanufacturing, ranking **3rd in the Asia-Pacific and 12th worldwide**.
 - It is emerging as a key hub for **generic biologics** and innovative drug production.
 - The sector's export contribution is growing, with an estimated additional **USD 10 billion expected by 2030**.
- **India's Vaccine Leadership:** India's strong capabilities in vaccine manufacturing have earned it the title of the "pharmacy of the world."
 - The country produces **60% of the global vaccine** supply and meets **40-70%** of the WHO's demand for Diphtheria, Tetanus, and Pertussis (DPT) vaccines.
 - During the COVID-19 pandemic, the **Serum Institute of India** emerged as the world's largest vaccine producer.

Challenges and Suggested Measures to Boost Biotechnology Sector:

| Challenges | Way Forward |
|--|---|
| Slow approval for biotech products. | Establish centralized regulatory bodies like the National Biotech Regulatory Authority (NBRA) for quicker approvals. |
| Biotech startups face challenges securing funds (e.g., Biosimilars) | Expand schemes like BioRIDE to fund R&D and offer tax incentives for biotech startups. |
| Insufficient biotech parks (e.g., limited biotech hubs in Eastern India). | Create a suitable environment and Develop more biotech parks in underdeveloped regions (Biotech Policy 2015). |
| Weak IP protection for innovations (e.g., issues in patenting vaccines). | Improve patent law enforcement , and create biotech-specific IP cells . |
| Reliance on foreign suppliers for critical raw materials (e.g., enzymes for biopharmaceuticals). | Increase domestic manufacturing capacity for raw materials (e.g., API production under Atmanirbhar Bharat). |

Conclusion

Despite regulatory hurdles and funding gaps, India's biotechnology sector is primed for continued growth. Ongoing reforms in **IPR, research funding, and collaboration between public and private sectors** are in line with **a SDG 9 (Industry, Innovation, and Infrastructure)**, ensuring sustainable, and inclusive growth.