

GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

RAJYA SABHA
UNSTARRED QUESTION NO. 1241
TO BE ANSWERED ON 05.12.2024

SCIENTIFIC RESEARCH AND TECHNOLOGICAL INNOVATION

1241 Dr. Parmar Jashvantsinh Salamsinh:

Shri Mayankbhai Jaydevbhai Nayak:

Dr. Kalpana Saini:

Will the Minister of SCIENCE AND TECHNOLOGY be pleased to state:

- (a) the role of biotechnology in transforming India's scientific landscape; and
- (b) the impact of scientific advancements for general public particularly in areas such as healthcare and agriculture?

ANSWER

MINISTER OF STATE (INDEPENDENT CHARGE) FOR
THE MINISTRY OF SCIENCE AND TECHNOLOGY & EARTH SCIENCES
(DR. JITENDRA SINGH)

a) Biotechnology has played a transformative role in reshaping India's scientific and technological landscape, contributing to advancements in healthcare, agriculture, industry, and environmental sustainability. Biotechnology is integral to India's journey toward becoming a knowledge-driven economy. By addressing societal challenges through innovation, biotechnology is helping to shape a sustainable and inclusive future. Following are key highlights of the biotechnology impact in India's scientific landscape:

Advancements in Healthcare: India has emerged as a global hub for vaccine production and generic drugs. Biotechnological innovations enabled the development of affordable vaccines. Initiatives like GenomeIndia to construct a comprehensive catalogue of genetic variations for India's population have enhanced our understanding of genetic diseases, paving the way for

precision medicine. Biotech startups have developed rapid and cost-effective diagnostic tools, such as RT-PCR kits for COVID-19, improving healthcare delivery.

Revolutionizing Agriculture: The introduction of Bt cotton significantly boosted India's agricultural productivity by enhancing pest resistance. Biofertilizers and Biopesticides technologies have promoted sustainable farming practices through eco-friendly alternatives to chemical fertilizers and pesticides. Techniques like tissue culture and marker-assisted selection are being used to develop high-yield, drought-resistant, and disease-resistant crop varieties.

Environmental Sustainability: Biotechnology has enabled the cleanup of pollutants using microorganisms to restore contaminated environments. Conversion of organic waste into compost or energy is gaining momentum in India. India's push towards renewable energy includes advancements in biofuels, reducing dependency on fossil fuels.

Startups and Innovation: India's biotech ecosystem has flourished with the emergence of startups supported by Government initiatives like Make in India, and Biotechnology Industry Research Assistance Council (BIRAC) supported Public-private partnerships programs. Various funding opportunities have propelled biotech research, bringing India closer to becoming a global biotech hub.

b) Scientific advancements have significantly improved the quality of life for the general public, particularly in areas such as healthcare and agriculture. These fields have seen transformative changes that have enhanced accessibility, affordability, and efficiency. Scientific advancements in healthcare and agriculture have had a profound positive impact on society, addressing critical issues like food security and health equity.

In healthcare sector, improved disease diagnosis and treatment, vaccine development, production of generic drugs etc. has made essential medicines more affordable. Public health campaigns backed by scientific research, such as sanitation drives (e.g., Swachh Bharat mission) and vaccination programs, have reduced disease burden. Advances in neonatal care, fertility treatments, and maternal health monitoring have significantly reduced infant and maternal mortality rates.

In agriculture sector, the Green Revolution introduced high-yielding crop varieties, significantly boosting food production. Crops like Bt cotton have improved pest resistance and reduced dependence on chemical pesticides. Drought-resistant and flood-tolerant crops developed through biotechnology help farmers cope with climate change. Biofertilizers and biopesticides promote eco-friendly farming, reducing soil and water pollution. Organic farming techniques, supported by scientific advancements, cater to the growing demand for healthy and sustainable food. Scientific interventions like crop insurance, mobile apps for weather forecasting, and digital platforms for selling produce ensure better income and reduced risk for farmers. Advances in cold storage, food processing, and preservation technologies have minimized waste and extended the shelf life of agricultural produce.

The Department of Biotechnology (DBT) continues to drive transformative initiatives, through support to biotechnology research & development programs, research resources, scientific infrastructure, and human resource & skill development programs. DBT-Biotechnology Research Innovation Council (BRIC) institutions focus on cutting-edge research and innovation by advancing programs in healthcare, agriculture, and environmental biotechnology. These efforts are fostering a robust ecosystem for biotechnological innovation, effectively bridging the gap between scientific research and societal benefits, and ensuring that advancements in biotechnology contribute to India's inclusive and sustainable development.

Overall, scientific advancements have made broader impacts for the general public in the form of improved nutrition, economic growth, enhanced quality of life, empowerment through technology.
