



One Day One Genome Initiative

[Source: PIB](#)

Why in News?

Recently, the 'One Day One Genome' initiative was launched by the **Department of Biotechnology (DBT)** and [Biotechnology Research and Innovation Council \(BRIC\)](#).

- It was launched on the **1st foundation day of BRIC** at the **National Institute of Immunology (NII)**, New Delhi.

What is One Day One Genome Initiative?

- **About:** It is an **initiative designed to highlight** India's unique [microbial diversity](#) and its role in the environment, agriculture, and human health, leveraging data from **genome sequencing**.
- **Objective:** It aims to publicly release a fully annotated **bacterial genome** from India, along with a detailed **summary, infographics, and genome data**.
- **Coordination:** It will be coordinated by **Biotechnology Research and Innovation Council-National Institute of Biomedical Genomics (BRIC-NIBMG)**, an institute of the Department of Biotechnology.
- **Potential Benefits:**
 - Understanding microbial functions can lead to **better waste management** and pollution control strategies.
 - Insights into beneficial microbes can enhance **crop yields and promote sustainable farming** practices.
 - Identifying microbes with antimicrobial properties may lead to **new treatments and drugs**.

Genome Sequencing

- **About:** The genome of an organism consists of a unique sequence of [DNA or RNA](#) made up of **nucleotide bases**. Determining the order of these bases is called **genomic sequencing**.
 - [Genome sequencing](#) helps identify genome-encoded traits such as important **enzymes, antimicrobial resistance, and bioactive compounds**.
- **Genome Sequencing Process:**
 - **Extraction:** DNA or RNA is extracted from cells of [bacteria, viruses, or pathogens](#).
 - **Library Preparation:** RNA or single-stranded DNA is converted into double-stranded DNA, chopped into shorter pieces, and ends of the fragments are modified.
 - The sample, now called a **"library,"** is ready for sequencing.
 - **Sequencing:** The library is loaded into a sequencer that identifies **nucleotide bases** using **fluorescence** or electrical current changes.
- **Applications:** It is critical for understanding microbial dynamics, improving **public health, managing environments, advancing agriculture**, and developing medical solutions.

How Do Microorganisms Contribute to Environment, Agriculture and Human Health?

- **Role in Environment:** They play crucial roles in **biogeochemical cycles**, **soil formation**, **mineral purification**, and the breakdown of **organic wastes** and **toxic pollutants**.
 - E.g., Anaerobic bacteria like ***Clostridium*** and ***Methanogens*** break down organic matter into **methane** and **carbon dioxide**.
- **Role in Agriculture:** Microorganisms are vital for **nutrient cycling**, **nitrogen fixation**, **soil fertility**, pest and weed control, and responding to environmental stress.
 - E.g., ***Rhizobium* bacteria** make a **symbiotic relationship** with **leguminous plants (e.g., beans, peas, lentils)** to convert atmospheric **nitrogen into ammonia** that the plant can use.
- **Role in Human Health:** They play essential roles in **digestion**, immunity, and even mental health.
 - E.g., ***Lactobacillus*** bacteria break down **lactose (milk sugar)** and other **carbohydrates** into **lactic acid**.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. With reference to agriculture in India, how can the technique of 'genome sequencing', often seen in the news, be used in the immediate future? (2017)

1. Genome sequencing can be used to identify genetic markers for disease resistance and drought tolerance in various crop plants.
2. This technique helps in reducing the time required to develop new varieties of crop plants.
3. It can be used to decipher the host-pathogen relationships in crops.

Select the correct answer using the code given below:

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

Ans: (d)