

CBSE Class 12 Biology Notes Chapter 10: These notes are very useful for students getting ready for their CBSE Class 12 board exams because they make complex ideas easier to understand.

The chapter explains how microbes are important in different areas, such as farming and medicine. For example, yeast is used in baking bread and brewing beer, while some bacteria help make the soil healthier by fixing nitrogen. The notes also cover how microbes are used in making antibiotics, vaccines, and enzymes, which are important in many industries.

By studying these notes students will learn how microbes affect our daily lives and why they are important for food security and health. This knowledge helps students see the big picture of how tiny organisms can have a big impact on the world. Overall these notes help build a strong understanding of microbiology and prepare students for future studies in science.

CBSE Class 12 Biology Notes Chapter 10 Microbes in Human Welfare Overview

CBSE Class 12 Biology Notes for Chapter 10 Microbes in Human Welfare are created by subject experts of Physics Wallah.

By breaking down complicated ideas these notes make it easier for students to understand the helpful roles of microbes. Overall these notes are a great study aid for students preparing for their CBSE Class 12 board exams helping them learn more about microbiology.

CBSE Class 12 Biology Notes Chapter 10 Microbes in Human Welfare PDF

CBSE Class 12 Biology Notes for Chapter 10 Microbes in Human Welfare explain how tiny organisms, called microbes help us in many ways. This easy-to-understand guide is helpful for students preparing for their CBSE Class 12 board exams. You can find more details in the PDF link below.

CBSE Class 12 Biology Notes Chapter 10 Microbes in Human Welfare PDF

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Here we have provided CBSE Class 12 Biology Notes Chapter 10 Microbes in Human Welfare-

Microbes in Human Welfare

Microorganisms, often seen as harmful pathogens, actually play a vital role in enhancing human welfare. They contribute significantly in various areas especially in household and industrial products.

In Household Products:

Microbes are essential for the fermentation process. They help in turning milk into yogurt and curd, and they also aid in making cheese and paneer. They are responsible for fermenting dough, which is used to make popular foods like bread, idli and dosa.

In Industrial Products:

Microbes are crucial in the production of alcoholic beverages, as they ferment sugars into alcohol. They are also responsible for creating antibiotics, such as Penicillin, which help combat infections. Furthermore, these microorganisms produce various chemicals, enzymes, and bioactive molecules that have numerous applications in human health and industry.

Microbes in Human Welfare: Sewage Treatment and Biogas Production

In Sewage Treatment

Sewage treatment is crucial for reducing pollution before disposing of wastewater. This process is primarily carried out by heterotrophic microbes found in sewage. The treatment occurs in two stages: primary treatment and secondary treatment (or biological treatment). These stages significantly lower the biochemical oxygen demand (BOD) of the effluent. BOD measures the amount of oxygen consumed by bacteria to break down organic matter in water. A higher BOD indicates a greater potential for pollution. Thus, sewage is treated until its BOD is sufficiently reduced to ensure safer discharge into the environment.

In Biogas Production:

Microbes like *Methanobacterium*, which thrive in anaerobic sludge, play a key role in sewage treatment and are also found in the stomachs of ruminants. Cattle excreta, or gobar, is rich in bacteria, making it a valuable resource for biogas production, commonly known as gobar gas. This biogas can be used as a renewable energy source for cooking and heating.

As Biocontrol Agents:

Biocontrol involves using biological methods to manage plant pests and diseases instead of relying solely on chemical pesticides. This approach promotes a healthier ecosystem by encouraging natural predators and pests, reducing the need for harmful chemicals. Microbial biocontrol agents, such as *Bacillus thuringiensis*, are commonly used and can be applied as dry spores on plants to protect them from pests. Advances in genetic engineering have enabled scientists to insert genes from *Bacillus thuringiensis* into plants, making crops like Bt-cotton resistant to insect attacks. Baculoviruses from the genus *Nucleopolyhedrovirus* are used as effective biological control agents.

Microbes in Production of Biogas and Biocontrol Agents

Microbes in Production of Biogas:

Biogas is a renewable energy source created by the action of microorganisms breaking down organic matter in the absence of oxygen. This mixture of gases primarily consists of methane, along with carbon dioxide (CO₂) and hydrogen (H₂). The bacteria responsible for this process are known as methanogens, such as *Methanobacterium*, which thrive on cellulosic materials.

In biogas plants, cattle excreta, commonly referred to as gobar, serves as a rich source of methanogens for biogas production. The technology for biogas generation was pioneered in India through the efforts of the Indian Agricultural Research Institute (IARI) and the Khadi and Village Industries Commission (KVIC). A typical biogas plant includes a concrete tank where organic waste and dung slurry are collected. A floating cover sits atop the digester, moving upward as gas accumulates. This gas is then channeled through an outlet pipe for use, while the leftover slurry is expelled through another outlet and can be used as fertilizer. Biogas plants are often constructed in rural areas, where there is easy access to large quantities of cattle dung.

Microbes as Biocontrol Agents:

Biocontrol refers to managing plant diseases and pests using biological methods rather than harmful chemicals like pesticides and insecticides. This approach is crucial for organic farming, where the goal is to maintain a balanced ecosystem instead of completely eliminating pests. For instance, beneficial insects such as ladybirds and dragonflies help control populations of aphids and mosquitoes, respectively.

To manage caterpillar infestations on crops like brassicas and fruit trees, the bacterium *Bacillus thuringiensis* is employed. Another notable biocontrol agent is the fungus *Trichoderma*, which naturally inhabits plant root systems and helps control various plant pathogens. Baculoviruses, particularly those from the genus *Nucleopolyhedrovirus*, are used to target specific insect pests. These viruses offer a species-specific approach, making them ideal for narrow-spectrum insecticidal applications, thus supporting sustainable agricultural practices.

Microbes as Biofertilizers

Biofertilizers are beneficial organisms that enhance the nutrient quality of the soil, helping plants grow healthier. They mainly include bacteria, fungi, and cyanobacteria, which play essential roles in improving soil fertility.

One of the key contributors to soil nitrogen levels is Rhizobium bacteria, which form root nodules on leguminous plants. These nodules help fix atmospheric nitrogen, making it available to the plants for various metabolic processes. Free-living bacteria like Azotobacter and Azospirillum reside in the soil and also convert atmospheric nitrogen into forms that plants can use.

Fungi, particularly in a symbiotic relationship with angiosperm plants, are vital for soil health. This association, known as mycorrhiza, is often formed with fungi from the Glomus genus. Mycorrhizal fungi help absorb phosphorus from the soil and transfer it to the plants, while also offering added benefits such as resistance to root-borne pathogens and increased tolerance to salinity and drought.

Cyanobacteria, such as Nostoc and Anabaena, are autotrophic microbes found in both aquatic and terrestrial environments. They play a significant role as biofertilizers, especially in paddy fields, where they fix atmospheric nitrogen and contribute organic matter to the soil, further enhancing its fertility.

By utilizing these microbes as biofertilizers, farmers can improve soil health naturally, promote sustainable agriculture, and reduce the need for chemical fertilizers.

Benefits of CBSE Class 12 Biology Notes Chapter 10 Microbes in Human Welfare

- **Simplified Learning:** The notes break down complex concepts related to microbes and their benefits into simpler, easily understandable language making it accessible for all students.
- **Comprehensive Coverage:** They provide a thorough overview of the various roles that microbes play in human welfare, including their applications in food production, medicine, agriculture and waste management.
- **Exam Preparation:** These notes are an excellent resource for students preparing for their CBSE Class 12 board exams, ensuring they have all the important information at their fingertips.
- **Increased Awareness:** Understanding the beneficial roles of microbes can enhance awareness about their importance in environmental sustainability and human health.
- **Support for Future Studies:** A solid grasp of this chapter lays a strong foundation for students pursuing further studies in biology, biotechnology and environmental sciences.