

NCERT Solutions For Class 12 Biology Chapter 10 Microbes In Human Welfare

Q1. Bacteria cannot be seen with the naked eyes, but these can be seen with the help of a microscope. If you have to carry a sample from your home to your biology laboratory to demonstrate the presence of microbes with the help of a microscope, which sample would you carry and why?

Answer:

If I have to carry a sample from your home to your biology laboratory to demonstrate the presence of microbes with the help of a microscope, then in order to demonstrate the presence of microbes, we can take curd from our homes as curd contains millions of bacteria.

Q2. Give examples to prove that microbes release gases during metabolism.

Answer:

When any bacteria grow on any material, it uses that material as the substratum to acquire food and starts metabolising that material to release some products. For example, the puffed appearance of dough of dosa is due to the release of gases like CO_2 by the bacteria growing on them. Large holes on Swiss cheeses are also due to the release of gases produced by bacteria growing on them

Q3. In which food would you find lactic acid bacteria? Mention some of their useful applications.

Answer:

Lactic acid bacteria (LAB) is found in curd. The useful applications of LAB are as follows:

1. These bacteria can convert milk into curd.
2. LAB are also found in our stomach to check the growth of harmful bacteria in our stomach.
3. LAB increases the amount of vitamin B12 in curd. Thus, it makes curd nutritious.

Q4. Name some traditional Indian foods made of wheat, rice and Bengal gram (or their products) which involve the use of microbes.

Answer:

Indian food made of Wheat- Bread, bhatura, cake

Indian food made of rice- Idli, dosa, uttapam

Indian food made of Bengal gram- Dhokla, Khandvi

Q5. In which way have microbes played a major role in controlling diseases caused by harmful bacteria?

Answer:

Role of microbes in controlling diseases caused by harmful bacteria:

Microbes are used to produce antibiotics. The antibiotics are chemical substances that are obtained from microorganisms and that kill other microorganisms like bacteria. The

first antibiotic was penicillin and it was obtained from fungus *Penicillium notatum*. Penicillin acts by degrading the cell wall of bacteria.

Q6. Name any two species of fungus, which are used in the production of the antibiotics.

Answer:

Penicillium notatum and *Penicillium chrysogenum* are used for preparing Penicillin.

Q7. What is sewage? In which way can sewage be harmful to us?

Answer:

The municipal wastewater that is drained into sewers and drains is known as sewage. It contains a large amount of organic matter, microbes, human excreta etc. When sewage is not treated properly, it degrades the quality of water and acts as a breeding site for the mosquitoes. This may lead to diseases like dengue, malaria etc in nearby communities. Thus sewage can be harmful to us.

Q8. What is the key difference between primary and secondary sewage treatment?

Answer:

The differences between the primary and secondary treatment of sewage are as follows:

Primary sewage treatment	Secondary sewage treatment
Primary sewage treatment is a mechanical process	Secondary sewage treatment is a biological process in which waste

that removes solid waste materials	materials are enzymatically treated by bacteria and other microbes
It is a less expensive and simple process	It is an expensive and complicated process

Q9. Do you think microbes can also be used as a source of energy? If yes, how?

Answer:

Yes, microbes can be used as sources of energy. For example, we know that various microbes produce different types of gases as their end products. One such gas is biogas. It is a mixture of gases produced by microbes and is used as a fuel. Similarly, some anaerobic bacteria which grow on cellulosic materials produce gases like methane, hydrogen gas and CO₂. Thus, we can say that microbes can be used as a source of energy.

Q10. Microbes can be used to decrease the use of chemical fertilisers and pesticides.

Explain how this can be accomplished.

Answer:

Generally, farmers use chemical fertilizers and pesticides in their fields. However, these chemical-based fertilizers and pesticides have deleterious effects on us. They tend to pollute the environment including soil and nearby water bodies. The fruits, vegetables and grains grown in fields in chemical fertilizers and pesticides, the chemicals get incorporated in them and they become toxic for animals and humans. Thus, farmers need to find more environmental friendly methods to control pests and fertilize the soil.

Biocontrol agents and biofertilizers are being used now to control pests and fertilize the soil respectively.

Microbes as biocontrol agents:

These are microbes or other biological organisms that can be used to control pest and parasite populations in fields. For example, the Bt toxins of *Bacillus thuringiensis* are used to control lepidopteran insects. *Trichoderma* is free-living fungi that are very common in the root systems and control several plant pathogens. Baculoviruses are also pathogens that attack insects and other arthropods. The majority of baculoviruses used as biological control agents are in the genus *Nucleopolyhedrovirus*. These viruses are excellent candidates for species-specific, narrow spectrum insecticidal applications.

Microbes as biofertilizers:

Bio fertilisers are organisms that enrich the nutrient quality of the soil. The main sources include bacteria, fungi and cyanobacteria. The root nodule formed by *Rhizobium* bacteria on the root of leguminous plants increases the nitrogen level of soil, necessary for various metabolic processes. *Azotobacter* and *Azospirillum* are free-living bacteria that live in soil and fix atmospheric nitrogen into organic forms. Cyanobacteria such as *Nostoc*, *Anabaena* are autotrophic microbes found in aquatic and terrestrial environment that fix atmospheric nitrogen.

Q11. Three water samples namely river water, untreated sewage water and secondary effluent discharged from a sewage treatment plant were subjected to BOD test. The samples were labelled A, B and C; but the laboratory attendant did not note which was which. The BOD values of the three samples A, B and C were recorded as 20mg/L, 8mg/L and 400mg/L, respectively. Which sample of the water is most polluted? Can you assign the correct label to each assuming the river water is relatively clean?

Answer:

BOD means biochemical oxygen demand. It refers to the amount of oxygen consumed if all organic matter in 1 ltr of water is oxidized by bacteria. BOD tests measure the rate of uptake of oxygen by microorganisms in the water sample. Greater the value of BOD more is the polluting potential. Out of the three samples mentioned above, secondary effluent has the highest BOD value, so it is most polluted. So, the correct labelling will be:

- (a) Secondary effluent
- (b) River water
- (c) Untreated sewage water.

Q12. Find out the name of the microbes from which Cyclosporin A (an immunosuppressive drug) and Statins (blood cholesterol lowering agents) are obtained.

Answer:

Cyclosporin A – *Trichoderma polysporum* (fungus)

Statins – *Monascus purpureus* (yeast)

Q13. Find out the role of microbes in the following

- (a) Single cell protein (SCP)

Answer:

Microorganisms like bacteria, yeast etc can be cultured on a large scale in the fermenters. They can be treated in many ways, dried and used as a food source or animal feed. These

microorganisms that can be used as potential sources of proteins for animals and humans are called single cell protein. SCP is rich in proteins and can be produced in laboratories.

The major advantage of SCP is as follows:

1. The production of SCP do not depend upon climatic factors,
2. The microorganism grows at a very fast rate and requires very less space
3. The cost of production of SCP is very less.
4. Microorganisms used as substrates are otherwise pollutants so it also reduces pollution .

Q13. Find out the role of microbes in the following

(b) Soil

Answer:

Microbes decompose complex organic debris into a dark amorphous substance called humus and degradation products which can be used as manure to increase the fertility of soil. The manure can loosen the soil and increases aeration in the soil. It contains many organic substances which are easily assimilated by plants. Some microbes are used for enriching soil fertility. Microorganisms like *Azotobacter* and *Rhizobium* can be used as nitrogen fertilisers. Thus, it can be said that microbes play an important role in improving the quality of the soil.

Q14. Arrange the following in the decreasing order (most important first) of their importance, for the welfare of human society. Give reasons for your answer.

Biogas, Citric acid, Penicillin and Curd

Answer:

These can be arranged as Penicillin - Biogas- Curd- Citric acid.

Penicillin is an antibiotic which is used to cure many diseases like pneumonia. Thus it should be the most important.

Biogas serves as a source of clean fuel, so it is the second most important.

Curd comes next which is a nutritious milk product.

Citric acid is used in food processing industries. Thus, it is last in the list

Q15. How do biofertilisers enrich the fertility of the soil?

Answer:

The term biofertilizer is used for microorganisms that bring nutrient enrichment and minimize the environmental hazards of chemical fertilizers. These biofertilizers increase the physical and chemical structure of soil like buffer capacity and water holding capacity of the soil. Biofertilizers can be introduced into seeds, roots or soil in order to mobilize the desired nutrient. *Rhizobium* is a biofertilizer, that is introduced in roots and it fixes nitrogen for the plants. Similarly, Cyanobacteria like *Nostoc*, *Anabaena* are also used for fixing nitrogen.