

Chapter.10

Microbes in Human Welfare

Class – XII

Subject –Biology

1. 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 under a microscope, which sample would you carry and why?

Answer.1

I will take curd to the lab. A small drop of curd contains millions of Lactobacillus bacteria which can be easily seen under microscope.

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

Answer.2

When any bacteria grow on any material, it uses that material as their food and start metabolism of that material and release products. Puffed appearance of dough of dosa is due to the release of gases like CO₂ by the bacteria growing on them. Large holes on Swiss cheeses are also due to bacteria grown on them.

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

Answer.3

In curd we found Lactic acid bacteria (LAB). These bacteria can convert milk into curd. LAB also found in our stomach which checks the growth of harmful bacteria in our stomach. LAB increases the amount of vit B12 in curd.

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

Answer.4

Product of wheat: Cakes, bread etc.

Product of rice: Dosa, idli etc.

Product of Bengal gram: Khandvi, dhokla etc.

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

Answer.5

Antibiotics are used to treat many diseases which are caused by harmful bacteria. As we know, antibiotics are the chemical substances which are

produced by using microorganisms and these antibiotics can kill or reduce the growth of diseases causing organisms. Ex – penicillin.

- 6. Name any two species of fungus, which are used in the production of the antibiotics.**

Answer.6

Penicillium notatum and Penecillium chrysogenum are used for preparing Penicillin.

- 7. What is sewage? In which way can sewage be harmful to us?**

Answer.7

The municipal waste water that is carried to sewers and drains are called sewage. It contains a large amount of organic matter, microbes, human excreta etc. If sewage is disposed in rivers untreated then it will cause pollution in water bodies and can spread diseases on a large scale.

- 8. What is the key difference between primary and secondary sewage treatment?**

Answer.8

Primary	Secondary
Mechanical process through which solid coarse or waste materials are removed	Biological process through which involves the action of microbes.
It is less expensive and less complicated	It is much expensive and complicated process.

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

Answer.9

Yes. Various microbes produce different types of gases as their end products. Biogas is a mixture of gases produced by microbes and biogas is used as a fuel. Some anaerobic bacteria which grow on cellulosic materials produce gases like methane, H and CO₂. These gases are called Methanobacterium.

10. Microbes can be used to decrease the use of chemical fertilizers and pesticides. Explain how this can be accomplished.

Answer.10

In recent days, pests and plant diseases are controlled by chemicals and pesticides. These chemicals and pesticides are polluting the environment, soil and water; they are quite harmful and toxic and incorporated into fruits, vegetables and crops. Using biological methods for controlling diseases and

pests is better. These are called bio control agents like toxin produced by *B.sphaericus* kills insect larvae. NPV are also used as bio-pesticides. With the help bio-engineering these producing genes can be incorporated into plant's genetic material. This produces pest resistant plants, ex- Bt-cotton.

11. 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.11

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 measures the rate of uptake of oxygen by microorganisms in water sample. Greater the value of BOD more is the polluting potential. Out of the three samples mentioned above, secondary effluent have the highest BOD value, so it is most polluted. So, the correct labeling will be:

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

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

Answer.12

Cyclosporin A – *Trichoderma polysporum* (fungus)

Statins – *Monascus purpureus* (yeast)

13. Find out the role of microbes in the following and discuss it with your teacher.

- a) Single cell protein (SCP)
- b) Soil

Answer.13

- a) Single cell proteins: Microorganisms like bacteria, yeast etc can be cultured on a large scale into the fermenters treated in many ways, dried and used as a food source or animal feed, these are called single cell protein. SCP is rich in proteins which can be produced in lab. The production of SCP doesn't depend upon climatic factors; the microorganism grows at a very fast rate and requires very less space. Due to this, cost of production of SCP is very less. Microorganisms used as substrates are otherwise pollutants so it also reduces pollution
- b) Soil: Microbes decompose complex organic debris into dark amorphous substance called humus and degradation products which forms farm-yard manure which increases the fertility of soil. The manure loosens the soil, increases aeration and contains many organic substances which are easily assimilated by plants. Some microbes are also used to enrich the fertility of soil. A microorganism like *Azotobacter* *Rhizobium* enriches the soil with nitrogen.

14. 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.14

Order will be as follows:

Penicillin - Biogas- Curd- Citric acid.

Penicillin is an antibiotic which is used to cure many diseases like pneumonia. Biogas serves as a source of fuel after this comes curd which is a nutritious milk product. Citric acid is used in food processing industries.

15. How do bio fertilizers enrich the fertility of the soil?

Answer.15

Bio fertilizers mean those microorganisms which bring nutrient enrichment and minimize the environmental hazards and increases the ecological benefits. Bio fertilizers increase the physical and chemical benefits of soil like buffer capacity and water holding capacity of soil. Some bio fertilizers act as bio pesticides because they excrete antibiotics. Azotobacter increases 15% - 30% additional yield in vegetable crops, besides fixing atmospheric nitrogen hormones like auxins and vit B12 it also enhances seed germination and plant growth. One of the best qualities of bio fertilizers is it doesn't cause atmospheric pollution.