Mentor Guru

Class 12 – Biology

Chapter 8 – Microbes in Human Welfare

Short Types Question with Answer

Q.1. What is the significance of floes in the biological treatment of wastewater?

A.1. They are portions of bacteria related to fungal filaments which form mesh-like structures. It helps in digestion of organic matter, eliminate pathogens and liberate nutrients in the sewage effluents.

Q.2. What is the role of the bacteria *Bacillus thuringiensis* in regulating caterpillars of insect pests?

A.2. It produces an endotoxin which upon ingestion and liberation into the gut of the larvae of insect pest, destructs the gut lining of the insect hence killing it.

Q.3. The fungi mycorrhizal benefit the plant in which it harbours, How?

A.3. It absorbs phosphorous from the soil and transfers to the host cells. They also provide resistance against root pathogens to the host plants. It promotes the overall development and growth of the plant and shows tolerance to drought and salinity. Thus fungal hyphae aids in producing organic food and also procure nourishment and shelter from higher plants.

Q.4. How are cyanobacteria used in the fields of paddy?

A.4. They fix nitrogen from the atmosphere and supplement organic matter to increase the fertility of the soil. Examples – Nostoc, Anabaena, Oscillatoria.

Q.5. Write about the discovery of Penicillin.

A.5. It was the first antibiotic to be discovered and is an accidental discovery. Alexander Fleming noted a mould of Penicillium growing in unlaundered culture plates of Staphylococcus. The mould hindered the growth of

Staphylococcus. The antibiotic was later isolated from the fungus to be named after the mould *Penicillium notatum*.

Q.6. Who was credited for demonstrating the significance of Penicillin as an antibiotic?

A.6. Howard Florey and Ernst Chain.

Q.7. How is the restoration of good health in humans brought about by bioactive molecules of fungal origin?

A.7. Cyclosporin-A is utilized as an immunosuppressant in organ transplant patients which is generated by the fungus Trichodermapolysporum. The yeast Monococcuspurpureus produce Statins which are commercially used as agents that lower blood cholesterol levels.

Q.8. State the significance of enzymes in detergents used for washing clothes. Are they produced from unique microbes?

A.8. Lipases are used in formulations of detergent that result in the breakdown of oil hence aids in the removal of grease and stains of oil from clothes. They are obtained from Geotrichumcandidum and Candida lipolytica.

Q.9. Write the chemical nature of biogas. Name one organism which produces biogas.

A.9.

- Chemical nature of biogas – CH_4 , CO_2 , H_2.
- A variety of methanogen – Methanobacteria is involved in biogas production.

Q.10. What is the role of microbes in reducing environmental degeneration caused by chemicals?

A.10. Microbes are being used as pesticides and fertilizers to reduce environmental degradation and are called as biopesticides and biofertilizers respectively. As biofertilizers, microbes enrich soil nutrients by fixing atmospheric nitrogen in the soil, examples – Azospirillum, Azotobacter, Rhizobium etc. As biopesticides(Bacillus thuringiensis) they check the growth of insect pests. A fungal species – Trichoderma is effectively used as a biocontrol agent for many plant pathogens. Baculovirus in genus

nucleopolyhedrovirus is used as a biological control agent for narrow spectrum, species-specific insecticidal applications.

Q.11. Describe broad-spectrum antibiotic. Give an example.

A.11. It hinders the maturity of both gram-negative and gram-positive bacteria. Example – Jetracyclines, Phenicols, Fluoroquinolones.

Q.12. What is another name used to address the viruses parasitizing bacteria?

A.12. Bacteriophages. They are viruses which do not eat bacteria. They infect and replicate within the bacteria.

Q.13. Name the bacteria which is used as a clot buster. Mention about its mode of action.

A.13. Bacterium Streptococcus secretes Streptokinase which is used as a clot buster. It has a fibrinolytic action which breaks down the clots that are formed in the blood vessels of patients that undergo myocardial infarction which prevents heart attack in such patients that can otherwise occur because of occlusion by clots.

Q.14. Giving two examples describe biofertilizers.

A.14. Biofertilizers supplement the nutrient quality of the soil. Their main source is fungi, bacteria and cyan bacteria. Fizotobacter, Rhizobium can fix atmospheric nitrogen in the soil. Blue-green algae like Nostoc, Anabaena add organic matter to the soil and increase soil fertility.

Long Types Question with Answer

Q.1. For the execution of massive volumes of waste waters rich in organic matter, why is aerobic degradation more important than anaerobic degradation?

A.1. It is because facultative and aerobic microbes that occur naturally such as protozoa, fungi, bacteria etc residing in the wastewater can rapidly oxidize soluble organic and nitrogenous compounds. The process if further accelerated due to mechanical addition of oxygen hence eliminating most of the pathogenic content of the effluent.

Q.2. Discuss the main ideologies crucial in the biological control of diseases and pests.

A.2. The fundamental idea is it is natural and eco-friendly. It involves the utilization of entities to monitor the community of pests and pathogens in an ecosystem. An example is Trichoderma, it is an antagonist which acts against certain soil-borne plant pathogens. Likewise, Penicillin hinders the growth of Staphylococcus and hence has been used in the penicillin production to check several bacterial pathogens. Baculovirus in genus Nucleopolyhedrovirus is used as a biological control agent for the species-specific narrow-spectrum insecticidal application. Bacillus thuringiensis is used to control insects as it acts as a biopesticide. The complete biological regulation of pest is recognised to be much more advantageous in an ecologically sensitive area.

Q.3.

a) What is the consequence of discharging larger volumes of sewage that is untreated into a river?

b) What is the significance of anaerobic sludge digestion in sewage treatment?

A.3. a) If water is untreated and dispensed directly into rivers it will lead to adverse water pollution with pathogenic bacteria, protozoa and organic matter. If this water is consumed, it would lead to outbreaks of water-borne diseases. b) Anaerobic bacteria digest the aerobic bacteria and the fungi that are present in the sludge and the residual organic matter in anaerobic sludge digestion. During this digestion, a mixture of gases is produced such as hydrogen sulphide, methane and carbon dioxide. These biogases can be utilized as a source of energy as it is inflammable.

Q.4. Describe the kind of food that would have lactic acid bacteria. Mention their useful applications.

A.4. Lactic Acid Bacteria(LAB) of the Lactobacillus species is most commonly found in food items such as curd and yoghurt. During the formation of curd, a small amount of curd is added to milk which acts as an initiator. Microbes present in the starter rapidly multiply at suitable temperatures, thereby causing the conversion of milk into curd. The LAB releases acids during the growth curdle and digest the milk protein partially which thereby facilitates the digestibility of the milk protein. Few of its applications are:

- Enhances the nutritional quality of milk by increasing vitamin B-12 content
- Regulates disease-checking microbes in the stomach

Q.5. How can microbes be used to decrease the use of chemical fertilizers and pesticides?

A.5. The chemical fertilizers and pesticides are an effective way to protect the plants against diseases and enhance their growth. But these contain a large amount of toxic chemicals. These chemicals harm the plants if provided in large quantities. They can also adversely affect human health and the environment. Hence, microbes are devised as an alternative.

Microbes such as *Bacillus thuringiensis* and *Rhizobium* were used to control pests and retain soil fertility to enhance plant growth. They are environment friendly and have no toxic effects on human and plant health.