MICROBES IN HUMAN WELFARE

Microbes are cliwerse-protozoa, bacteria, fun.gi and microscopic plants viruses, viroicl and also prions that are pfoteinaceous infectious agents_ Bacteria and fungi can be grown on nutritive media to form colonies, which can be 56"ell by necked eyes and very useful in study of microorganisms.

Microbes in household products

a. IA icroorga nisnris like Lactobacillus and other commonly called lactic acid bacteria [LAB] grow In milk and convert it to turd. A small amount of curd added to fresh milk as inoculurn or starter contain millions of LA13. which multiply at suitable temperature and convert milk into curd.

b. The dough is used for making foods such as dosa and idili is fermented by bacteria. The puffed-up appearance of dough is due to the production of CO_2 gas. The dough used for making bread is fermented using baker's yeast (Soctharornyces *cerviskre).* Microbes are also used to ferment fish, Soyabeans and barribm shoots to make foods.

Microbes in inch,mtriall production

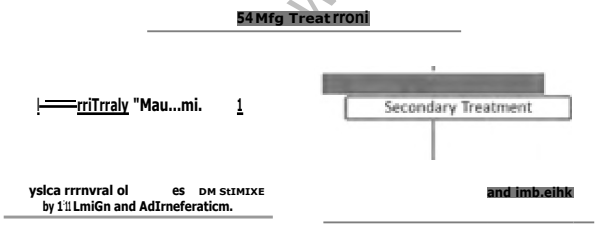
A number of products like beverages and antibiotics involve uses of microbes. Production on large scale requires growing microbes in very large vessels called fernenters.

(a) **Fermented Beverages- yeast (5orchuromyres cereWsiaell is used far production of beverages** li ke wine, bear, whisky and rum. Wine and bear are produced without distillation whereas whisky, **brandy and rum** a re **produced by distillation of the fermented broth_**

(b) Antibiotics. they are chemical substances produced by some microbes and car' kill or retard the **growth of other microbes. Penicillin was first antibiotic to be discovered_ Antibiotics have great** improved our capacity to treat deadly diseases such as plague, whooping cough, diphtheria and leprosy.

(di **Chemical, Enzymes and other** aioactiwe **Molecures are commercially produced by microbes_** *A,otroll'itts* iriiger (fungus) produce citric acid, *Acetobacter acefl* ilbacteria) produce acetic acid and **Lactobacillus (bacterium) produce lactic acid etc. Biaactive molecules like ryclosoorine A • that is** used as an immunosuppressive agent in organ .transplant patients is produced by fungus Tdchoisrerrrirt **oal'ysporkern.**

fkolicrobes in sewage Treatmerrt Municipal waste water [sewage]. contains large amount of organic **matter and microbes which are pathogenic and cannot be discharged into natural water bodies** li ke rivers and streams. Sewage is treated in sewage treatment plant to make It less polluting by using **heterotrophic microbes naturally present in sewage_ Sewage treatment is done in two stages-**



- in primary treatment, floating debris is removed by sequential filtration. grit (soil and mall **pebbles) are removed by sedimentation.**
- Secondary treatment **or biological treatment involves passing Of pri mary** effluents in large aeration tank to help the growth of aerobic microbes into flocs.. These microbes increase the consumption of grip nic wastes **and d**ecrease the ROD (biological **oxygen clema nd) of the** effluents.
- BO D **is the amount of oxygen** that would be **consumed if all the organic** matter **in** one **litre of** water were oxidised by baoteria. It measures the **amount of organic matter** present in the **water. Greater the BUD** of water more *it* is polluted_
- **Sludge is passed into large tanks called anaerobic sludge digesters in** which **anaerobic bacteria digest the bacteria and fungi in the sludge and produce mixture of as called** biogas, which is a mixture of methane, hydrogen sulphide and carbon dioxide_
- **The effluents from the secondary treatment plant are released into water bodies**

Mil:robin in Production of Biagas

Blogas Is a mixture of .gases produced by the microbial activity that can be used as fuel. Certain bacteria that .grows anaerobically on cellulosic material produce large amount of methane along with CO2 and I_12. These bacteria are collectively called methanogens 01.4ettrorro,bacterluria).

Biogas Plant — the excreta of cattle (gobar) is rich in methanogens bacteria and is used for generation cf blogas also called as gobar gas.

- Blogas plant consists of a concrete tank in which bio-wastes are collected and slurry of dung Is fed_
- A floating cover is placed over dikes¯ter that moves upward when gas i5 produced. The gas produced is removed and supplied through an outlet pipe for consumption.
- The spent slurry is removed through another outlet and used as fertilizer's_ HiCitag plant is rnore often Ouild in rural areas as large amount of cattle dug is available easity.

Microbes as Blocontrol agent

Biocontrol means use of biochemical method for controlling plant disease and pests. The chemical used as pesticides and insecticides are harmful to human beings and animals.

- Biological control of pests and disease is a method of controlling pest on natural prediction rather than chemicals. The organic farmer creates a system where the pests are not eradicated but kept at manageable level by corriplex system of check and balance within the living and vibrant ecosystem_ For example,. the Ladybird and Dragonflies are used to get rid of aphids and mosquitoes re5IDecti well?. On tiras:sicas and fruit Vee, to control IP Aterlly caterpillars bacteria Bacaus thurictvierisils is used.
  Biological control developed for used in the treatment of plant disease is the fungus Trichoderna.. Trichoderma are free•living fungi that are very common in the root systems that control several plant pathogens_

Microbes as Bin fertilizers

Rio fertilizers are organisms that enrich the nutrient quality of the soil. The main sources includes bacteria, fun.gi and cyanobacteria_

- The root nodule formed by Rhizobiurn bacteria on root of leguminous plants increase the nitrogen level of soil, necessary for various metabolic processes- Aaotobacter and Mospirilluiri are free living bacteria that live iri soil and fix atmospheric nitrogen into organic forms.
- Symbiotic association of fungi with angiosperm plants rriyoon hliza) also increase the fertility of soil. Glornu form mycorrhiza that absorbs phosphorus from the soli and passes it to the plant These microbes also provide benefits like resistance to root-borne pathogens, tolerance to salinity and drought_

Cyanobacteria .ritostoc Ariobaenali, an autotrophic microbes found in aquatic and terrestrial environment fix atmospheric nitrogen. In paddy field this acts as important bio_fertiliser. Blue green° algae also add organic matter to the soil and increase its fertility.