CHAPTER 7

INTRODUCTION TO MICROBIOLOGY

LECTURE 02

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PROBIOTICS

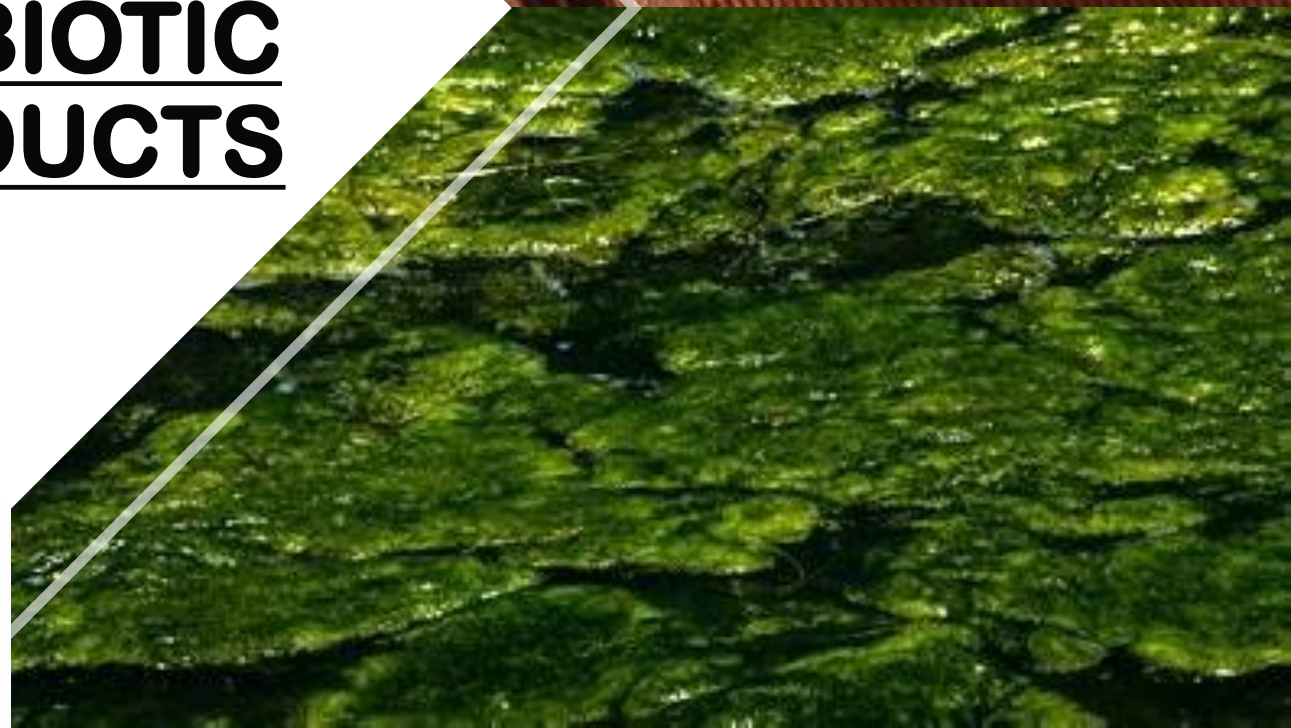
- Milk products containing bacteria like Lactobacillus, Acidophilus, Lactobacillus caesi, Bifidobacterium bifidum, etc.
- Maintain balance of the intestinal microbes.





EXAMPLES OF PROBIOTIC PRODUCTS





BREAD

- Dough – made from Saccharomyces cerevisiae, water, salt, etc.
- On fermentation of carbohydrates,

  Sugar → CO_2 + Ethanol
- Dough rises and bread becomes spongy.
- Commercially, compressed yeast is used which contains vitamins, carbohydrates, proteins, which makes the bread more nutritive.



VINEGAR

- Vinegar is 4% acetic acid, CH_3COOH.
- Used in preservation.
- Steps :

1) Ethanol is prepared.
2) Acetobacter and Glucanobacter is mixed with ethanol.
3) When acetic acid is obtained, it is separated using rarefaction.
4) Acetic acid is bleached using potassium ferrocyanide.
5) After pasteurization, SO_2 is added to produce vinegar.



- Soya sauce – fermentation of wheat/rice and soyabean with the help of a fungus, Aspergillus niger.





PRODUCTION OF BEVERAGES :

SR NO.	FRUIT	MICROBE USED	ROLE OF MICROBE	NAME OF BEVERAGE
1)	Caffea arabica	Lactobacillus brevis	Separating seeds from fruit.	Coffee
2)	Theobroma cacao	Candida, Hansenula, Pichia Saccharomyces cerevisiae	Separating seeds from fruit.	Cocoa
3)	Grapes	Sacchromyces cerevisiae	Fermentation of juice	Wine
4)	Apple	Sachhromyces cerevisiae	Fermentation of juice	Cider


ACE
Hard Pumpkin Cider
5% Alcohol by volume
12 FL. OZ. 355 ML
RIOJA
BUJANDA

MICROBIAL ENZYMES

- Active at low temperature, pH and pressure.
- No unnecessary by products are produced.
- Enzymes can be re-used, hence are eco-friendly.
- Dirt can be removed on adding detergents.
- Microbial enzymes are used in various industries like cheese, plant extracts, textile, leather, etc.

Organic acids used in various commercial products and microbes useful for the same

Source	Microbe	Amino acid	Use
Sugar and beet molasses, ammonia salt	*Brevibacterium, Corynobacterium*	L-glutamic acid	Production of monosodium glutamate (Ajinomoto)
Sugar molasses, salt	*Aspergillus niger*	Citric acid	Drinks, toffees, chocolate production
Glucose, corn steep liquor	*Aspergillus niger*	Gluconic acid	Production of minerals used as supplement for calcium and iron
Molasses, corn steep liquor	*Lactobacillus delbrueckii*	Lactic acid	Source of nitrogen, production of vitamins.
Molasses, corn steep liquor	*Aspergillus itaconius*	Itaconic acid	Paper, textile, plastic industry, gum production

Substances obtained by microbial processing and their roles

Substances obtained by microbial processing	Roles
Citirc, Malic and Lactic acid	To impart acidity
Glutamic acid, Lysine, Tryptophan	Protein binding
Nycin and natamycin	Microbial restrictor
Ascorbic acid (Vit. C), B_{12}, B_2	Antioxidants, vitamins.
Beta carotene, lycopenes, xanthenes, lutein	Edible colours
Polysaccharides, glycolipids	Emulsifiers
Vanillin, Ethyl butyrate (fruit flavour), peppermint flavour, essence of various fruits and flowers	Essence
Xylitol, aspartame	Artificial sweetener (low calorie)

ANTIBIOTICS



- **DEFINITION** :

  A chemical substance which retards/inhibits/prohibites the growth on other micro organisms.

- These antibiotics are obtained from bacteria and fungi.

- They are used against many gram positive and gram negative bacteria.

- Eg) Rifamycin is effective against tuberculosis.

