**Fermented food items**

Numerous food items are produces by fermentation process in which one or more kinds of microbes are responsible for the characteristic flavour, texture and quality if the product. The microorganisms that produce the desirable changes may be the natural flora on the material to be fermented or may be added as ‘starter’ cultures.

**Bacterial fermented food items**

Important food items produced in whole or in part by bacterial fermentations are sauerkraut, pickles, sausage, olives etc. for humans and ensilage for animal fodder. Lactic acid bacteria are mainly responsible for the desirable type of fermentation required for the production of each of these substances though other microorganisms are also involved.

1. **Sauerkraut .** This food item results from a fermentation of cabbage by bacteria which are normally present on the cabbage. The cabbage is cleaned, shredded, bruised by tamping and is packed with about 2% of salt in jars or barrels. Wooden frames are placed on the cabbage to create pressure. The combined action of salt and pressure draws a considerable proportion of juice from the cells of the leaves. The cells of the leaf respire for a time, rapidly utilizing any oxygen present and creating anaerobic conditions. Enterobacter and Erwinia sp. Initiate fermentation which accelerated by Leuconostoc mesenteroides producing 0.7- 1.0% lactic acid. Lactobacilli then start multiplying and continue the fermentation to the final stage increasing the acidity to as much as 2.4% lactic acid. Acids, esters and diacetyl give pleasant aromas and flavours. Fermentatipn requires three to four weeks at 21-29°C. in the preparation of sauerkraut, a large proportion of the antiscobutic vitamins are preserved.
2. **Dill pickles.** Dill pickles are prepared by washing cucumbers, packing them in cask with alternating layers of dill leaves, covering with water and adding salt spices and sometimes sugar. The soluble sugars of the cucumber gradually diffuse out and are fermented with lactic acid bacteria. The early fermentation is initiated by Leuconostoc mesenteroides, Stretococcus faecalis and Pedicoccus cerevisiae and is continued in the final stage by Lactobacillus brevis and L. plantarum producing lactic acid.the later accumulates sufficient quantities to inhibit the growth of putrefactive bacteria. Fermentation proceeds under favourable conditions for 6-8 weeks and finally results in a change in the colour, consistency and flavour of the food items.
3. **Sour bread.** This bread is a sour dough, from which starter is saved to inoculate the next batch. The microorganisms appear to be E. coli and Enterbacter species which produce a mixed lactic acid fermentation i.e. accompanying the gas there is always some lactic acid which tends to make the bread taste sour.
4. **Salt rising bread.** This type of bread is dependent upon the spontaneous fermentation of wild yeasts and common contaminating bacteria, e.g., E.coli and Enterobacter types. In this case salt is added to the bread which cuts down some of the extraneous contamination and one simply lets it ferment by itself.
5. **Idli.** Idli is prepared from parboiled rice and decuticled black gram dal and represents a popular breakfast dish of South India. Soaked ingredients are thoroughly mixed, little salt is added and then the mixture is allowed to ferment overnight for 10-12 hours. Predominant microorganisms that bring fermentation are Leuconostoc mesenteroides, Streptococcus faecalis and Pedicoccus cerevisiae. The fermented material increases in volume and becomes sour. It is then cooked by backing in steam resulting in a soft, spongy product having sour flavour and good taste.
6. **Green olives**. These food items are prepared by the lactic acid fermentation of olives. Leuconostoc mesenteroides start the early fermentation which is continued by Lactobacillus brevis and L. plantarum.
7. **Ensilage**. The ability of microorganisms to produce acids, particularly lactic acid may be utilized also for processing and preservation of feeds for animals in the preparation of ensilage. Forage crops, sugarcane, sorghum, corn and potatoes are used as raw materials. Microorganisms of many kinds, e.g., bacteria belonging to family Enterbacteriaceae, such as Clostridium butyricum, Lactobacillus spp. and Streptococcus lactis start to grow in the plant juice and ferment carbohydrates into organic acids.
8. **Sausage**. Beef and pork are fermented by lactic acid bacteria e.g., Pedicoccus cerevisiae and Micrococcus spp. to prepare sausage.
9. **White or common bread**. In this bread preparation the moistened flour is mixed with yeast, Saccharomyces cerevisiae, and is allowed to stand for several hours in a warm pplace. Flour itself contains little free sugar, but there are sufficient quantities of starch splitting enzymes in it to produce some sugar during the leavening process. The sugar is rapidly fermented by the yeast with the production of alcohol and carbon dioxide, the later causing the rising of bread. During the baking process the alcohol is driven off.
10. **Oriental food**. In oriental countries large quantities of diverse food are prepared from soybean, wheat and rice through inoculation with members of mucorales, various yeast and Aspergillus oryzae. Food of the type includes **Temph**- a solid food prepared with soybeans processed with species of Rhizopus, **Sufu**-chinese cheese prepared from soybeans and Actinomucor elegans and Mucor spp., **Miso** (for soy-sauce) prepared from soybeans and wheat fermented with Aspergillus oryzae and other microorganisms.