17.4D: Edible Fungi

Fungi are used as food or as producers of a variety of food products (bread, wine, beer, etc.) or compounds used in different industries.

Learning Objectives

- Describe how yeast, molds and mushrooms are used in the food industry

Key Points

- The single cell yeast species, *Saccharomyces cerevisiae*, has been used as the major leavening agent in making bread for thousands of years.
- Different species of the mold *Penicillium* are added to milk or curd when making soft cheese to produce blue cheese.
- Mushrooms have fleshy fruit body with certain aroma and flavors as well as good nutritional properties and are used mostly as food.

Key Terms

- **leavening agent**: An organism or compound that can make dough rise and produce soft bread.
- **curd**: Curd is the solid coagulated fraction of milk after it has been digested with enzymes or treated with sour substances.
- **gangrene**: The death of tissue due to reduced blood supply as a result of infection or a blocked blood vessel.
Fungi are eukaryotic organisms that are separated taxonomically in the Fungi kingdom. The kingdom includes yeasts and molds (both microorganisms) and mushrooms. These organisms are ubiquitous all over the world. They have been used by people as food or as producers of a huge variety of food products or compounds used in different industries.

Figure: Saccharomyces cerevisiae: Single cells of baker’s yeasts under a light microscope. Total magnification is 1,500 x; gradation marks are 1 µm apart

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**Yeast**

The yeast species Saccharomyces cerevisiae has been used as leavening agent for the production of bread since ancient times. The yeasts ferment the carbohydrates in the dough and produce carbon dioxide that causes the dough to rise and the bread to be softer after baking. Different sources provided the starter cultures. Dough could be left exposed to the air before cooking. Beer foam or grape juice paste were also used as yeasts sources. Nowadays, the common used starters are pure cultures of Saccharomyces cerevisiae produced and sold as baker’s yeasts, although some artisan bakers maintain their own starter cultures. Other yeasts and some bacteria can be used as leavening agents too. For example, sourdough is made with Saccharomyces exiguus and Lactobacillus cultures that give it its sour taste.

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**Molds**

Molds are fungi which cells grow in long chains of filamentous hyphae. The first antibiotic used in modern medicine, penicillin, was isolated from Penicillium mold. Different species of the mold Penicillium are added to milk or curd when making soft cheese to produce blue cheese. The mold adds specific smell and flavor to the cheese. Some bacteria, such as Brevibacterium linens, are also used to give blue cheese its characteristic odor.
Each mold species is usually found in the environment of the local region where the production of specific brand started. To enhance the mold growth in cheese, different techniques are applied to improve the access of air. The cheese is ripen for weeks to months in dark cold places. Even before the discovery of penicillin, people used blue cheese to prevent gangrene in wounds.

**Mushrooms**

Edible mushrooms are macrofungi since they are visible with a naked eye. Mushrooms have fleshy fruit body with certain aroma and flavors as well as good nutritional properties and are used mostly as food. A few species of mushrooms have been cultivated but wild mushrooms are harvested as well. However, some mushrooms produce toxic compounds that can be life-threatening. Proper identification is key since quite often poisonous mushrooms mimic edible ones in appearance. Even if not dangerous, mushrooms in general are great absorbants of chemicals from the environment and sometimes they can make them toxic, e.g., pesticides, insecticides, heavy metals. Certain mushrooms have been used for their medicinal properties in some cultures.