

WAYS FOOD IS PRESERVED

Food is preserved to prevent spoilage caused by enzymes and by microorganisms.

ENZYMES

Enzymes are compounds responsible for the color and flavor changes that take place as fruits and vegetables ripen. If enzyme action isn't stopped, ripening will continue and there will be undesirable changes in color and flavor during storage of fresh or preserved products.

Enzyme action can be stopped by heating fruits and vegetables. The heat of canning destroys the enzymes. Vegetables are blanched before freezing and drying to slow down the enzymatic changes. Light-colored fruits are often dipped in an "antioxidant" such as ascorbic acid to prevent the browning caused by enzymes.

MICROORGANISMS

"Micro" means very small; an "organism" is a living thing. Even though we can't see them, microorganisms are present everywhere--in the air, in soil, in water, and even on all foods. These tiny organisms are divided into three groups: molds, yeasts, and bacteria.

Molds often form fuzzy patches on foods. Some molds grow on foods high in acid (such as fruits and pickles) and on foods low in moisture (such as jams).

Yeasts can cause foods to ferment. Fermented food smells sour and often has bubbles of gas. Some yeasts grow on fruits and pickles (high acid foods).

Bacteria can make food slimy, soft, and smelly, but sometimes there may not be any evident signs of spoilage. Some bacteria grow on low acid foods--meats, poultry, fish, and vegetables. The most dangerous bacteria (Clostridium botulinum) can grow in canned low acid food. If these bacteria have not been killed by correct heat processing in a pressure canner, they will grow and produce a toxin (poison). This toxin causes a deadly food poisoning called botulism.

Microorganisms need certain temperature, moisture, and acidity conditions to grow on food. Food preservation stops or slows down the growth of microorganisms by controlling these conditions.

Temperature

The heat of canning kills microorganisms. Molds and yeasts that grow on high acid foods can be killed at boiling temperatures (212 degrees F. at sea level). Fruits and pickles (high acid foods) can therefore be safely processed in a boiling water bath canner. However, a higher temperature is needed to destroy



the Clostridium botulinum bacteria that grow in low acid foods. These higher temperatures can only be reached under pressure in a pressure canner. (At 10 pounds pressure the temperature inside the canner is 240 degrees F. at sea level.)

Freezing temperatures stop the action of microorganisms but may not kill them. The microorganisms will start to grow again when the food is thawed.

Moisture

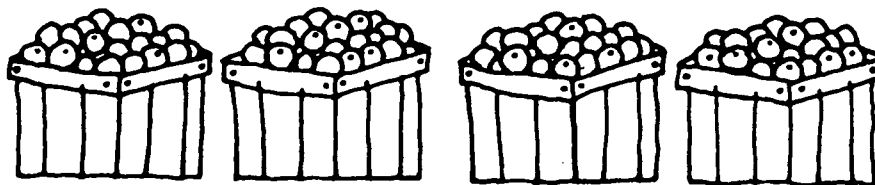
Drying removes moisture that microorganisms need for growth. When water is added back to dried foods, the microorganisms will start to grow again. Therefore dried foods should be stored in moisture-proof containers. If a food is not dry enough, mold can grow during storage.

The high sugar concentration in jams and jellies takes away moisture needed by microorganisms for growth.

High salt concentration in pickling and brining also inhibit growth of microorganisms by taking away moisture.

Acidity

Pickling prevents the growth of harmful microorganisms. They cannot grow when the acid content of foods is very high. Some molds and yeast are able to grow, however.



Prepared by Carolyn Raab, Extension Foods and Nutrition Specialist



Extension Service, Oregon State University, Corvallis, O.E. Smith, director. Produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties. Oregon State University Extension Service offers educational programs, activities, and materials without regard to race, color, national origin, sex, or disability as required by Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and Section 504 of the Rehabilitation Act of 1973. Oregon State University Extension Service is an Equal Opportunity Employer.