**FOOD PRESERVATION**

**F**ood preservation is the process in which the perishable food materials are given a suitable physical or chemical treatment to prevent their wastage, spoilage and to retain their nutritive value for long periods. Food processing can result in several advantages, some of which are –

* Increased self life.
* Decreased hazard from microbial pathogen.
* Decreased spoilage (microbial, enzymatic).
* Inactivation of anti-nutritional factors.
* Ensure round the year availability of seasonal foods.
* Perishable food can transport to far off distances from the site of production.
* Increased availability of convenience foods (i.e., ready-to-serve beverages, instant mixes),and
* Increased variety of foods, some with enhanced sensory properties and nutritional attributes.

**CAUSEASES OF FOOD SPOILAGES**

**All** food undergoes varying degrees of deterioration during handling and storage. Some food spoil rapidly, others keep for longer but for a limited period of time. Therefore spoilage of food refers to the alteration in foods or the food under goes some physiological, chemical and biological changes, which renders it inedible or hazardous to eat. Such food is essential for processing or preservation after it is harvested or slaughtered.

**There are several causes of food spoilages**

* **Growth & activity of bacteria, yeast, & mould** – Microorganism can causes visible changes in food. Milk turning sour, mould growth on bread, & fruit juice fermented by yeast are some example of visible signs of spoilage. The kind kind of microorganisms which spoil the food will depend on the composition of food, i.e., its pH, moister content, nutrients, temperature, etc.
* **Insect infestation** – Insect such as worms, weevils, & moths infest cereal grains & make grain unfit for consumption. Weevils bore holes into grains & multiply, destroying the flavor & the grain.
* **Enzymatic changes** – Natural enzymatic changes by autolysis, such as overmaturing, softening, browning, sprouting damage of food. i.e., Sprouting of potatoes, browning/ darkening of bananas,& softening of fruits & vegetables .
* **Chemical actions** – Chemical reactions which are not catalysed by enzymes or microorganisms can also results in chemical spoilage of food. Oxidative rancidity in fats & hydrogen swell in canned foods are examples of this type if spoilages.
* **Physical changes** – Physical changes in food caused by freezing, absorption of moisture, etc can spoil food. Mechanical damages such as bruising or cracked egg shells can accelerate spoilage by microorganisms or by enzymes. Bruised apples which are brown when cut or cracked eggs are signs of spoilage in foods.
* **Others** – moisture, light, time temperature etc are also responsible for spoilage.

Spoiled food cannot be rectified by any processing method. It results in wastages & discarded immediately. To prevent spoilage & wastage of food, any surplus food should be processed & preserved immediately.

**OBJECTIVES OF FOOD PRESERVATION**

The main objectives of food processing on a home scale, institutional scale, or in the food industry are similar. They includes –

* **Removal of unwanted matter from food –** unwanted matters may be inedible, indigestible or harmful to health, such as husk from grain, skin of some vagetables,coconut shells ect.The unwanted matter have to be removed by different process including shelling, milling , peeling etc.
* **Making food safe for consumption –** Some food contain natural toxins which need to be inactivated, i.e.,trypsin inhibitor in soya bean , fungal toxin such as aflatoxin in ground nut & grains, infected portions of food materials, green portion of potato is removed by visual examination ,& chemical toxin & poison are discarded. Ensure safety of food by using process to remove toxins & heat to develop microorganism& their toxins. Safe processing prevents contamination.
* **Increased digestibility –** most food are difficult to digest unless they are cooked. Cooking softens fiber, gelatinized starch, denatures protein, & makes food easier to digest. Foods need special kind of processing for preservation.
* **Enhance flavor colour & taste –** The acceptability of food depends on its organolyptic qualities.Processtng techniques enhance the appearance of food & many technique makes food more tasteful. The browning crust is formed due to Millered reaction which gives bakery items its baked flavor aroma & taste.Propcessing such as caramalization; fermentation etc gives food a different flavor.
* **Improving texture & consistency –** Processes such as emulsification, gel formation & increase in viscosity are aimed to improve the texture &consistency of ready to eat food.
* **Minimized nutrients loss –** Nutrition are better retained by controlled processing conditions such as autoclaving, freezer drying & controlled heat. Nutrients loss due to processing is managed by adding extra vitamins. Processed margarine, butter etc are fortified by vitamins. Other processed food often enriched with vitamins, minerals & lysine.
* **Extending the self life –** Processing extends the self life because apart from removing unwanted, spoilt,& harmful matter & subjecting the food to temperatures out side the danger zone, all processes such as dehydration, cold storage, canning & pasteurization are aimed at preservation to food.
* **Increased acceptability through fabricated foods –** New products of uniform sizes & shape are been introduced in the market. They are made from low- grade commodities which are plentiful or good for health.

**PRINCIPAL OF FOOD PRESERVATION**

The basic principal of food preservation includes:

1. Preservation or delay of microbial decomposition: That is archived by :
* Keeping out microorganisms (asepsis)
* Removal of microorganisms,i.e.,by filtration
* Hindering the growth of activity of microorganisms,i.e.,by low temperature, drying ,anaerobic conditions, &
* Killing the microorganisms,i.e.,by heat or radiations.
1. Preservation or delay by self – decomposition of food. This is brought about by :
* Destruction or inactivation of food enzymes i.e, by blanching&
* Preservation or delay of chemical reactions i.e, preservation of oxidation by means of an antioxidant.
1. Preservation of damage caused by insects, animals & mechanical causes.

**METHODS OF FOOD PRESERVATION**

* + Uses of low temperature (refrigeration, chilling freezing)
	+ Uses of high temperature (pasteurization, boiling, canning)
	+ Dehydration (drying under the sun, mechanical drying,freeze

drying , smoking)

* + Fermentation
	+ Irradiation
	+ Chemical preservatives
1. Class I preservatives / natural preservatives
2. Class II preservatives / chemical preservatives

**Uses of low temperature**

It used to retard chemical reactions & action of food enzymes & slow down or stop the growth of activities of microorganisms in food.

* Cellar storage (about 15degree centigrade) – root crops , potatoes, onions, apples etc
* Refrigerator or freezing (0 to 5 degree centigrade) – meat, poultry, fish, milk & milk products, fruits, vegetables etc.
* Freezing (-18 to -40 degree centigrade) – perishable food like meat, poultry, fish, ice-cream, peas, vagetables,etc.

 **Uses of High temperature**

 Food is heated up or cooked**.** Heat kill microorganisms , alter the protein structures & destroys enzyme activities of microorganisms in food .

* Boiling (at 100 degree centigrade) at home we preferred this process. Cooking of rice, vegetables, meat, fish etc.
* **Pasteurization** is a heat treatment that kill a part but not all microorganisms presents and usually involves the preparation of temp. Below 100degree centigrade.
1. Low temp holding (LTH) 62 degree centigrade for 30 minutes.
2. High temp short time (HTST) or flash method 72 degree centigrade for 15 minutes.
3. Ultra high temp sterilization (UTHS) 135 degree centigrade for 2 seconds. This method makes food commercially sterile. Such food is packed under aseptic condition & can be stored at room temp for three to six months.
* **Canning is** the process in which the foods are heated in hermetically sealed (airtight) jars or cans to a temp that destroyed microorganisms & inactivates enzymes that could be a health hazard or causes of food to spoil. **Canning is a vacuum sealed process** .Example – tinned food, such as soup, meat, beans, nuts milk, fish etc.

 **Irradiation** is another sterilizing technique in which the foods are bombarded by high –energy rays called gamma rays or by fast moving electrons to killed bacteria, fungi & insects& in some case s delay fruits ripening. It has been used in pasteurizing or sterilizing perishable food such as meat, fish, fruits & extending there storage lives for long periods.

**Chemical preservatives** are also referred as food additives. It is a substances added intentionally to food, generally in small quantitie to improve appreance, flavor, texture or storage properties.Suger ,salt ,oil ,spices, limejuice etc are the class I preservatives. Benzoic acid, sulfur dioxide, nitrites ect are the class II preservatives.

**Dehydration** it is a process usually accomplished by the removal of water. The dried foods are preserved because the avalablelity of water content is very low that the microorganism cannot grow & enzyme activities are controlled. Example – grapes (raisins), dates, raw mango (amchur), vegetable like cabbages, cauliflower etc.