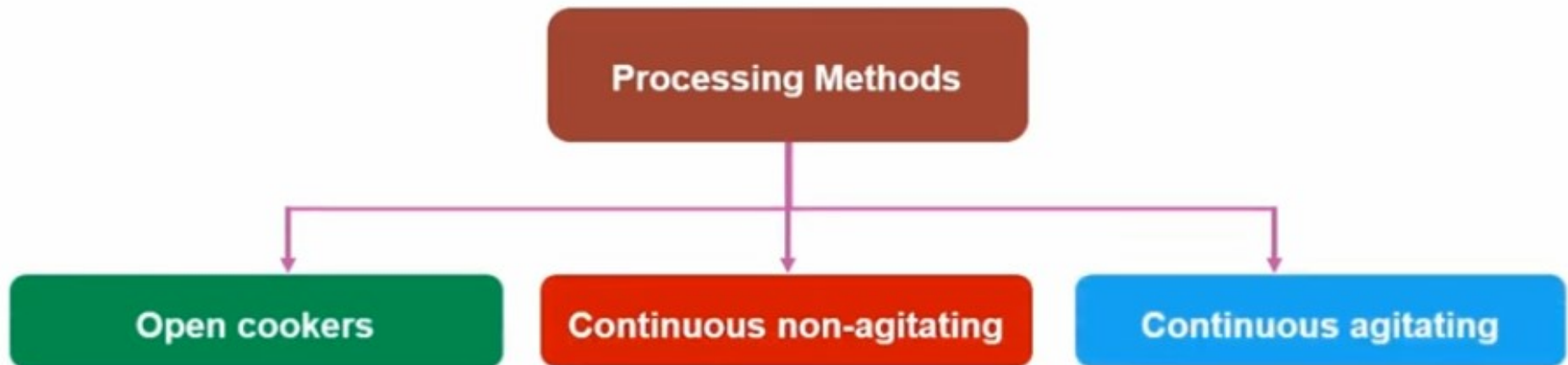


Preparation for Canning- Selection of Fruits and Vegetables



Preparation for Canning- Selection of Fruits and Vegetables

❖ Open cookers are made up on wooden tubs or galvanized iron tanks of desired capacity.



- ❖ In continuous non-agitating cookers, cans travel on a continuous moving belt in boiling water crates.
- ❖ Processing time reduced by using continuous agitating cookers.

Bottling of Fruits and Vegetables

- ❖ Bottles have high initial cost but reusable, and also proved to be very good containers for home preservation.
- ❖ Glass containers provides very attractive look and resistant to the development of metallic flavor.
- ❖ Glass containers have high cost so they are not suitable for manufacturer's point of view.
- ❖ General steps followed in processing are same as that of canning.
- ❖ Bottles are thoroughly washed and sterilized before filling and 1-1.5 cm head space should be left.



Effects of Canning on Foods

The time–temperature combinations used in canning have effect on naturally occurring pigments in foods. In fruits and vegetables, chlorophyll is converted to pheophytin, carotenoids.



Flavour and Aroma



In canned meats there are complex changes, for example pyrolysis, deamination and decarboxylation of amino acids, degradation.



In fruits and vegetables, changes are due to complex reactions which involve the degradation, recombination and volatilisation of aldehydes, ketones, sugars, lactones, amino acids and organic acids.

Texture or Viscosity



In canned meats, changes in texture are caused by coagulation and a loss of water holding capacity of proteins, which produces shrinkage and stiffening of proteins, which produces shrinkage and stiffening of muscle tissues.

The texture of solid fruit and vegetable pieces is softer than the unprocessed food due to solubilisation of pectic materials but is considerably firmer than canned products.

Advantages of Canning

Canning alters food chemically by changing the moisture, pH, or salinity levels to protect against microbes, bacteria, mold, and yeast.



Advantages of Canning



It also limits food enzyme activity.



Can keep canned foods on shelves from 1-2 years or longer.

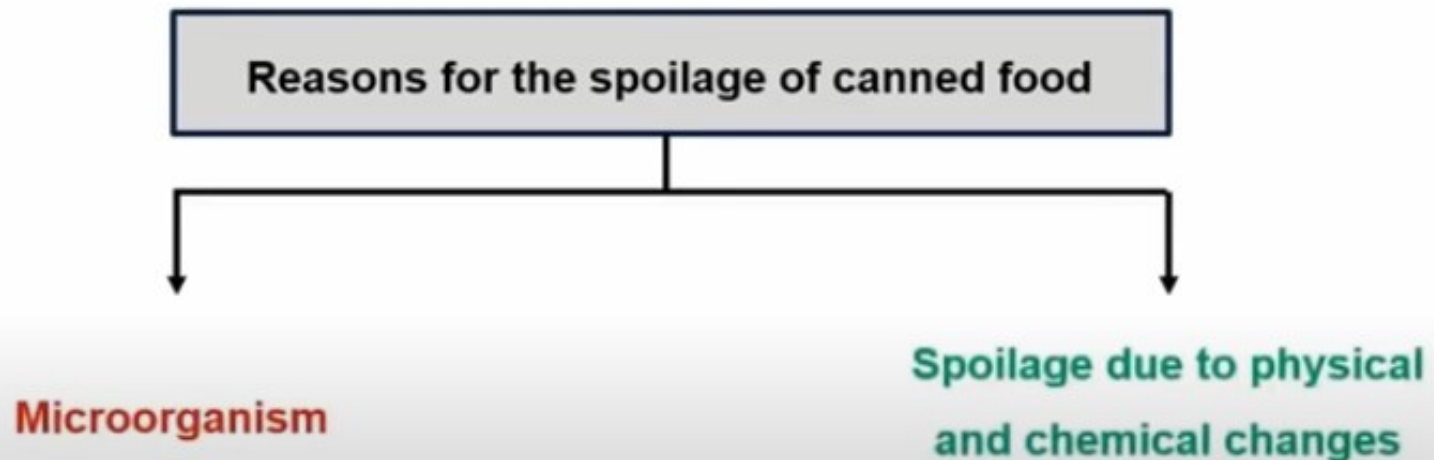


Can be economical when using home grown or locally grown produce.



Canning your own food is an excellent way to reduce your environmental impact.

Spoilage in Canned Foods



Spoilage of Canned Foods

(A) Spoilage of canned foods according to the condition and content of the can:

Swell

Bulging of both can ends by +ve internal pressure due to gas generated by microbial or chemical activity. Either hard or soft swell.

Flipper

A can with normal appearance but one end flips out when the can is struck against a solid object but snaps back to the normal under light pressure.

Springer

A can bulged from one end which if forced back into normal position, the opposite end bulgs.

Leakage

Perforated can.

Overfilled Can

Has convex ends due to overfilling and not regarded as spoiled.

Spoilage in Canned Foods

Spoilage due to physical and chemical changes

Swell

It is bulging of can due to pressure of gases formed by microbial and chemical action.

Hydrogen Swell

Hydrogen gas produced by the action of food acids on metal of can that can cause bulging of can. Canned food remains fit for consumption as it is free of microorganism.

Flipper

Swelling of can when both ends become convex and flips out, but when can push back to normal condition by little pressure. Flipper caused by overfilling, under-exhausting and gas pressure due to spoilage.

Spoilage in Canned Foods

Spoilage due to physical and chemical changes

Springer

It occurs when the can swells at both end due to insufficient exhausting or overfilling.

Soft swell

It is more or less similar to that of flipper in which both ends of can swell. When can is pressed, the end returned back to the normal position and springs back when pressure is removed.

Hard swell

It is a final stage of swell in which bulged end cannot be pressed back to normal position and can ultimately burst.

Spoilage in Canned Foods

Spoilage due to physical and chemical changes

Leakage

Leakage is due to defective seaming, nail holes caused by faulty nailing of cases, excessive internal pressure, corrosion and mechanical damage during handling.

Breathing

It is a very tiny leak in can through which air can pass in and destroy the vacuum.

Stack browning

When cans are not allowed to cool properly before storing stack browning takes place which results in discoloration, cooked flavor and soft product. So, it is necessary to cool product to 39°C before storage.

Spoilage of Canned Foods

(B) Spoilage of canned food according to the causes:

(i)

Microbial Spoilage: May result from insufficient processing or leakage.

3 types of
spore
forming
bacteria

Gas producing anaerobes and aerobes with optimum growth temp. 37 °C.

Gas producing anaerobes with opt. temp. 55°C.

Non-gas producing aerobes or facultative anaerobes with optimum temperature 55°C produce flat souring.

Spoilage in Canned Foods

Microorganism



- ❖ Thermophilic and mesophilic organism are responsible for canned food spoilage.
- ❖ Thermophilic bacteria can survive at a high temperature of 100°C.
- ❖ Facultative thermophiles can grow at 43°C and obligate thermophiles grow at 43-77°C.

Spoilage in Canned Foods

Microorganism

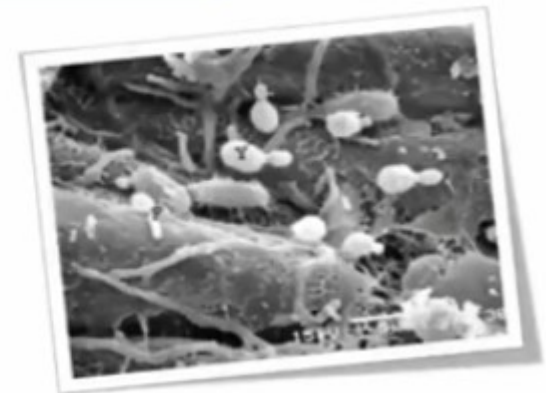
Clostridium

Bacillus

Yeast

Fungi

- ❖ They cause spoilage of can due to formation of carbon dioxide and hydrogen.



Spoilage of Canned Foods

(B) Spoilage of canned food according to the causes:

Leak can be detected by:

- ❖ Bubbles when squeezed under water.
- ❖ Disappearance of vacuum (concavity) when heated to 38 C followed by slow cooling.

Flat Souring:

- ❖ High acid formation without gas production.
- ❖ Sour odour, bitter taste, container not swollen.

Spoilage in Canned Foods

Microorganism



Flat sour

- Flat sour spoilage occurs mostly in non-acidic foods by Bacillus such as *B. coagulans* and *B. sterothermophilus* which produce acid without gas formation.
- Flat sour spoiled product is unfit for consumption as it has sour odour and highly acidic.

Spoilage in Canned Foods

Microorganism



Thermophilic acid spoilage

- *Clostridium thermosaccharolyticum*, an obligate thermophile, is responsible for TA spoilage in which cans swell due to production of carbon dioxide and hydrogen.

Spoilage in Canned Foods

Microorganism



Sulphide spoilage

- It is also known as sulphur stinker is caused by *Clostridium nigrificans*.

Spoilage of Canned Foods

(B) Spoilage of canned food according to the causes:

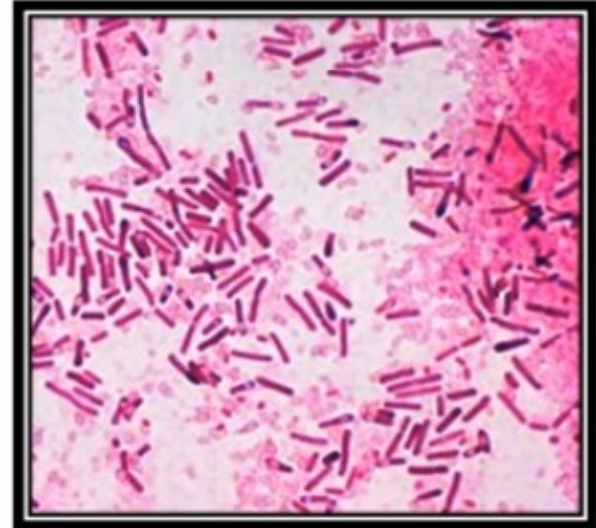
Caused by thermophilic bacteria:



Bacillus Coagulans



Bacillus Stearotherophilus



Bacillus Circulans

Spoilage of Canned Foods

(B) Spoilage of canned food according to the causes:

Hydrogen Swell

- Formation of hydrogen gas in can due to internal corrosion or scratch.
- Occur mainly in acidic foods (canned fruits).
- Rarely in canned meat but seen in canned sardines.
- Not related to fermentation or bacterial spoilage.
- Can show varying degree of bulging. when opened there is a release of odorless burnable gas.
- Quite harmless but undifferentiated from swell of spoiled can so, it is rejected.

Spoilage of Canned Foods

(B) Spoilage of canned food according to the causes:

Sulphiding

Discolouration of inside of can with pink to dark purple.

Occur due to reaction of sulphur-containing proteins with liberated H_2S from bacterial spoilage with the odor of rotted egg.

It may be accompanied with blackening when H_2S react with steel base of tin forming iron sulphide and may lead to pitting.

Sulphiding can be prevented by sulphur-resistant lacquer.