

Unit - V

Topic - I

## Prevention & spoilage of Bakery & confectionery products

- \* Bacteria
- \* Yeast
- \* Mold

### \* Bacterial spoilage:

spores of *Bacillus subtilis* - heat resistant.

This Micro-organism present in Raw Material eg. flour, sugar, & yeast causes Ropy in bread.

Ropy bread \* Discoloration from brown to black

\* Rotten fruit odour

\* Extremely moist, stringy bread crumb

This occurs in summer season - climate warm & humid.

*Bacillus lichiformis*

*Bacillus megaterium*

*Bacillus cereus*

} First fruit odour similar to that of pine apple - crumb becomes discoloured, soft & sticky

Slimy formation - effect of proteolytic & amylolytic enzyme produced by *Bacillus* strain

*S. aureus* - staphylococcus - Pie filling

*Salmonella* - chocolate, desiccated coconut, cocoa powder

*Salmonella typhimurium* - Pizza.

Strict Sanitary as well as Gmp could control along with proper care

## \* Yeast spoilage

Trichosporon variables

Saccharomyces sp - white spots in bread - chalk bread

Yeast - 2 types

- \* Visible yeast - white or pinkish patches
- \* Fermentative spoilage associated with alcoholic & estery odour hence osmophilic yeast.
- \* Yeast - bread - Pichia burtonii

## \* Mold spoilage:

$a_w$  - 0.65 to 8

~~Rhizopus~~ Rhizopus sp, Aspergillus sp, Penicillium sp  
Monilia sp, Mucor sp & Eurotium sp

## Preservation

\* Temp, pH,  $a_w$ ,  $pH$   
Molds - 3.5 - 5.5

Bacterial  $pH$  -  $< 4.5$

Temp molds -  $15-29^\circ C$

\* Reformulation to reduce product  $a_w$ :

Reduction  $a_w$  available - eg freeze drying, dehydration  
high osmotically active additives eg: sugar & salt

## \* Freezing

long term preservation

Quick freezing

Bread at  $-22^\circ C$  been fresh

## Sorbic acid & sorbates:

\* Sorbic acid and potassium salts are effective for anti mold agents.

\* Sorbic acid - (GRAS)

\* Used as mold inhibitor

\* Commercial use fungistatic

\* Potassium sorbate on mold has inhibitory effect on *Aspergillus niger* & *penicillium* species

\* 0.5 per cent - 2 weeks shelf life

\* The level that could be used in bakery

k) Sorbates - yeast

0.001-0.3 per cent

\* Sorbyl palmitate - mold - Interfering in fermentation

\* On heating during baking sorbyl palmitate is hydrolyzed into sorbyl palmitate - sorbic acid.

\* Propionic acid & its salts.

\* Acid or salt - Bacterial spoilage & mold.

\* Propionate 8 to 12 % - effective in mold growth

\* Use of weak acids such as (Potassium sorbate, calcium propionate, sodium benzoate) can inhibit the *Aspergillus niger*, *flavus*, *penicillium lorylophilum*.

\* Hurdle technology can be implemented

\* Pro preservative

Lactic acid bacteria.

## Contamination source of confection

- \* Raw Ingredients - liquid sugars, colour, nut, dairy products, starch, gelatin & egg
- \* Processing & storage condition
- \* Poor hygienic handling
- \* Packaging material
- \* Equipment & machine used

## Spoilage:

\* Hand candies & toffees least likely to undergo m.s compared to caramel & cream-filled chocolate

\* chocolate cream - *Clostridium* spp - *C. sporogenes*  
↓  
through sugar & starch

\*  $a_w$  - 0.6 to .83  $\rightarrow$  osmophilic yeast & xerophilic mold

\* yeast - *Tyrosaccharomyces romii*, *Brettanomyces bruxellensis*

\* mold - *Aspergillus*, *Penicillium*, *Verticillium*, *Rhizopus*, *Mucor*, *Trichothecium*.

\* bursting / fracturing of products result in leakage, slime formation, off-flavours & off-odors

## Prevention: \* controlling m.c

\* potassium sorbate & sodium benzoate

\*  $93.3^\circ\text{C}$  kills - vegetative bacteria, yeast & mold.