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Suggestion of food_microbiology:5005

Chapter: 02

Exam Date: 15/11/2013

1. Write down the name of factors affecting the Growth of Micro-Organisms. **Factors Effecting the Growth of Micro-Organisms**

- Intrinsic Factors**, or the compositional factors of a food affecting microbial growth
- pH
 - Moisture Content
 - Water activity
 - Oxidation-reduction potential
 - Physical structure of the food
 - Available nutrients
 - Presence of antimicrobial agents
- Extrinsic Factors**
- Temperature
 - Relative humidity/moisture
 - Carbon dioxide or oxygen
 - Types and numbers of Microorganisms in the food

2. How pH effect on the Growth of Micro-Organisms.

- pH effect:** Every microorganism has a minimum, a maximum and an optimal pH for growth. Microbial cells are significantly affected by the pH because the apparently have no mechanism for adjusting their internal pH. In general, yeasts and molds are more acid tolerant than bacteria. Foods with low pH values (below 4.5) usually are not readily spoiled by bacteria and are more susceptible to spoilage by yeasts and molds.
- Molds and Yeasts:** Both are acidic pH favors them. They both can grow in a pH range of 2 to 8.
- Bacteria:** A pH near neutrality (pH 7.0) favors their growth.

3. What is water activity? The effect of water activity on the Growth of Micro-Organisms.

- Water activity limit:** Microorganisms have an absolute demand for water. Without water no growth can occur. The exact amount of water needed for growth of microorganisms varies. The water requirement is best expressed in terms of available water or water activity a_w .
- $a_w = \text{water activity} = \text{vapor pressure of food} / \text{vapor pressure of water}$
- a_w of pure water is 1.00. Equilibrium relative humidity = $a_w \times 100$. (aw below 0.70 greatly reduces microbial growth)
- Most bacteria grow at aw 0.95-1.0.** Also they prefer foods with high water level a_w around 0.90. Bacteria need more water than molds and yeasts to survive.
- Mold:** They can grow in low water level (a_w 0.62-0.92). Many molds are osmotically tolerant and can grow at a_w as low as 0.6.
- Yeasts:** They prefer high water foods (a_w 0.62-0.92)

4. Classification of Micro-organism on Temperature and Oxygen

- Temperature**
- Micro-organisms can be categorized into one of four groups depending on their optimum growth temperature and the temperature range at which they will grow.
- i) **Thermophiles:** Have optimum growth at 55 °C and a growth range of 30 - 70 °C
 - ii) **Mesophiles:** Have optimum growth at 30 °C and a growth range of 10-45 °C
 - iii) **Psychrotrophiles:** Have optimum growth at 20 - 30 °C and a growth range of 0 - 40 °C
- Ability to use free oxygen microorganism have been classified as:**
- i. **Aerobic:** When they require free oxygen eg. Molds are aerobic & Some bacteria are (Acetobacter)
 - ii. **An-aerobic:** When they grow best in the absence of free oxygen eg. Some bacteria are (Clostridium).
 - iii. **Facultative:** When they grow well either anaerobically or an-aerobically
 - iv. **Facultative anaerobes:** they will grow in the presence or absence of oxygen eg. Yeast and some bacteria are (Bacillus).

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