

**Paper No.: 03**

**Paper Title: FOOD MICROBIOLOGY**

**Module – 06: Extrinsic factors affecting microbial growth and survival in foods**



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# INTRODUCTION

The ability of microorganisms to grow or multiply in a food is determined by the food environment as well as the environment where the food is stored.

- 1. Intrinsic factors** : Factors related to the food itself like nutrients, water activity, pH, redox potential etc.
- 2. Extrinsic factors**: Factors in the environment and external to the food, which affect both the microorganisms and the food itself during processing and storage.

Extrinsic factors include:

- Storage temperature
- Relative humidity
- Gases and
- Activities of other microorganisms



# EXTRINSIC FACTORS

Extrinsic factors important in microbial growth in a food include the environmental conditions in which it is stored .

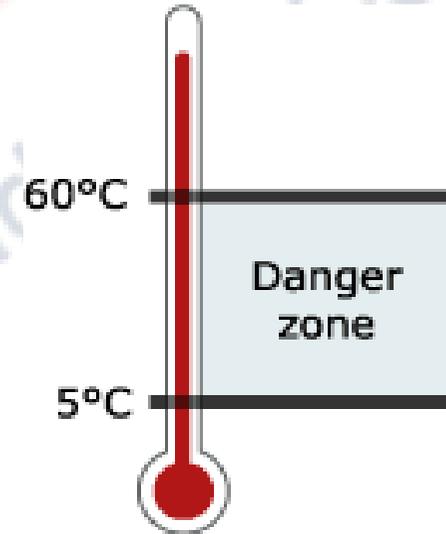
These include :

- Storage temperature
- Relative humidity
- Gases and
- Activities of other microorganisms



# STORAGE TEMPERATURE

- ❑ Foods are exposed to different temperatures from time of production until the time of consumption.
- ❑ Microbial growth is accomplished through enzymatic reactions which is depended on temperature.
- ❑ Microbial Groups: Psychrophiles, Mesophiles and Thermophiles
- ❑ Every  $10^{\circ}\text{C}$  rise doubles the catalytic rate of enzyme and every  $10^{\circ}\text{C}$  decrease reduces it to half.



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# RELATIVE HUMIDITY

- Relative humidity is a measure of water activity of the gas phase.
- High RH influence the water content of food and high water content promote microbial growth.
- When food stored in high relative humidity, dormant spores of bacteria or fungi to germinate.
- Once they are actively growing, they produce water as an end product of respiration.
- Hence they increase the water activity of their own, this favors the growth of high water activity requiring bacteria and increase in spoilage of food.
- Therefore, dry conditions are considered better for food storage as than moist conditions.



# GASES

Presence or absence of gases affects microbial affects type of microbial populations.

- ❑ Carbon dioxide regulates cell growth of certain bacteria.
- ❑ If partial pressure of carbon dioxide increases over a critical level, metabolic activity will be retarded.
- ❑ Delaying effect of Carbon dioxide increases with increase in concentrations.
- ❑ Carbon dioxide is used in packaging of some food items in order to control the growth of microbes.



# ACTIVITIES OF OTHER MICROORGANISMS

Presence or absence of other microbes affects microbial type of microbial populations.

- Microbial competition in food.
- Some microbes produces antimicrobial substances such as antibiotics, organic acids, alcohol, bacteriocins.
- Those metabolites inhibit the growth of other microbes.

**THANK YOU**