

FOOD PRESERVATION

TECHNOLOGY FOR CLIL

WHY DOES THE FOOD GO BAD?



MICROBES GROWTH



SOME FACTORS AFFECTING MICROBIAL GROWTH

- ▶ NUTRIENT CONTENT
- ▶ OXIGEN
- ▶ LIGHT
- ▶ pH
- ▶ WATER

NUTRIENT CONTENT

- ▶ LIKE US, MICROORGANISM CAN USE FOODS AS A SOURCE OF NUTRIENTS AND ENERGY



TEMPERATURE

- ▶ It is the most important factor that determines the rate of growth multiplication, survival and death of all living organisms.
- ▶ **HIGH TEMPERATURES** damage microbes by denaturing enzymes, transport carriers and other proteins.
- ▶ At very **LOW TEMPERATURES** membranes also solidify and enzymes do not function properly

LIGHT

- ▶ Essential for photoautotrophs
- ▶ As well as its intensity its wavelength may be significant



pH

- ▶ MOST SPOILAGE BACTERIA GROW BEST NEAR NEUTRAL pH
- ▶ Pathogenic bacteria (which cause diseases) tolerate a wider pH range
- ▶ Yeast and moulds have much greater tolerance to acid environment
(lower than neutral level)

pH



- ▶ pH needs to be controlled because small changes can effect bacteria growth.
-
- ▶ In fruit, a lower pH prevents bacterial growth and spoilage is dominated by yeasts and moulds (no pathogenic bacteria)



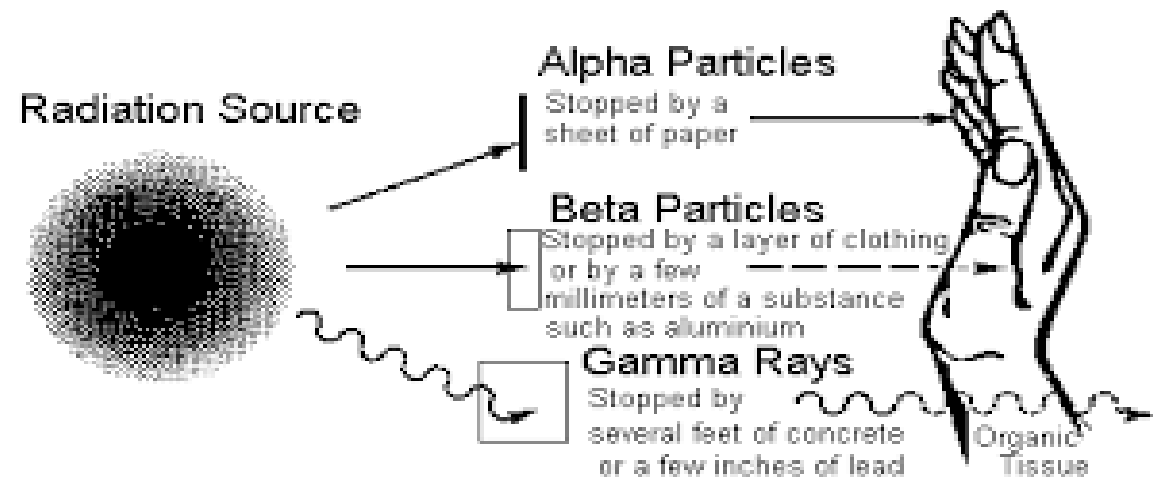
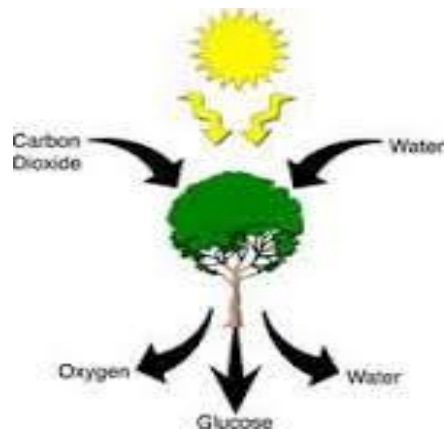
WATER

- ▶ Water is a fundamental element in human life
- ▶ Life, as we know it, is totally dependent on the presence of water in its liquid state.
- ▶ Many microorganisms can survive but not grow when their cytoplasm has been completely dried

LIGHT



- ▶ SUNLIGHT – the major source
- ▶ INFRARED is the major source of Earth's heat
- ▶ IONISING RAYS can produce mutations which may cause death
- ▶ VISIBLE LIGHT is beneficial because it is the source of energy for photosynthesis.



ENERGY

All organisms

Sunlight

Not sunlight

Phototrophs

Chemotrophs

Lithotrophs

Organotrophs

Inorganic
Organic

CARBON

CO₂

Food

CO₂

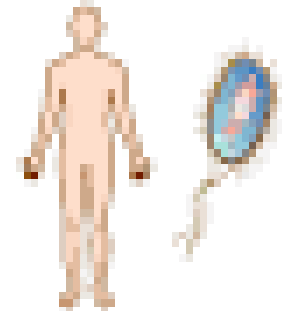
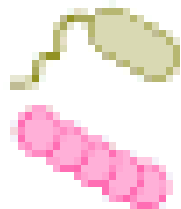
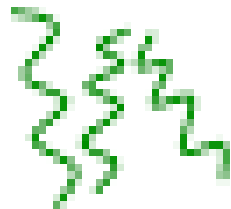
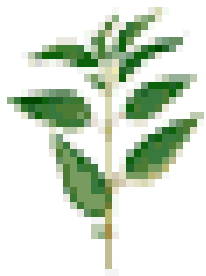
Food

Autotrophs

Heterotrophs

Autotrophs

Heterotrophs



FACTORS AFFECTING MICROBIAL GROWTH



Nutrient content of foods

Food item	Serving	Calcium (mg)	Vitamin D (IU)
Milk or yogurt	1 cup	280	100
Pizza	2 slices	300	Minimal
Cheese	1 ounce	200-300	Minimal
Greens (e.g. collard, kale)	¼ cup	230	0
Canned salmon	3 oz	150-300	500
Egg yolk	1	Minimal	30
Chocolate	1 ounce	Minimal	30
Calcium-fortified fruit juices	1 cup	~300	0
Fortified breakfast cereal	¼ - 1 cup	Varies	varies