



Outline of Status

1. Food Preservation
2. Need for preservation
3. Bio-preservation and its relevance
4. Methods of preservation



A) Physical methods of preservation(Heat and Energy)

i) High temperature

ii) Low temperature

iii) Special Treatments

B) Chemical & Biological methods of preservation

i) Addition of chemical preservatives

ii) Action of microbes

- **Bioprotective Cultures**

- **Fermentates**

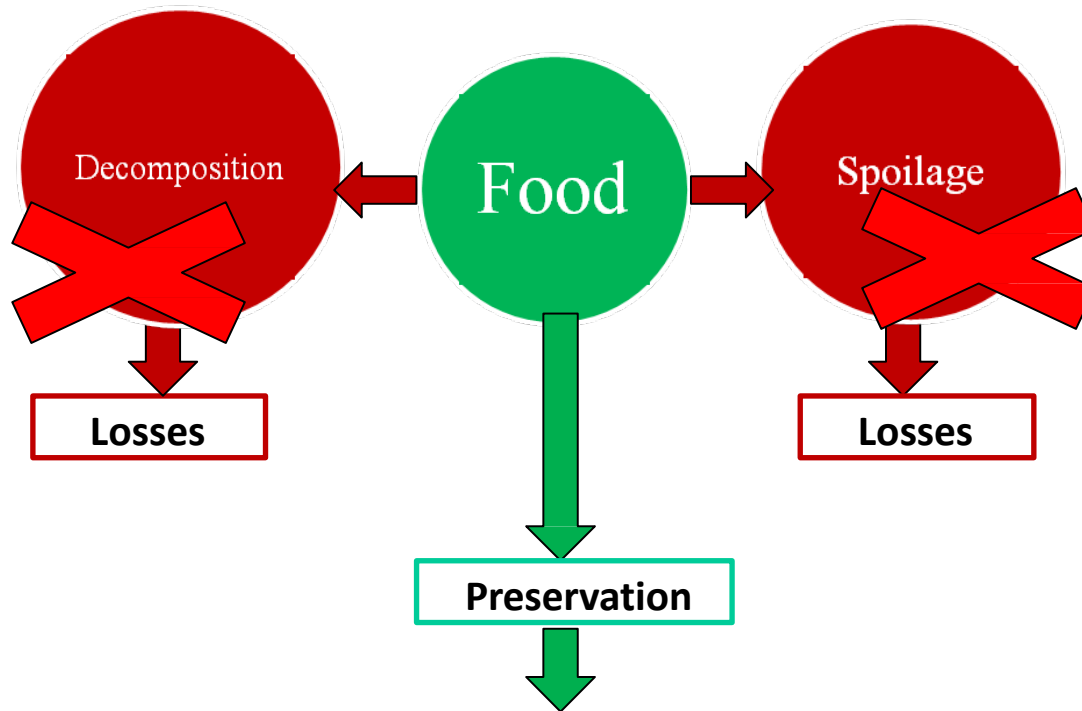
iii) Antimicrobial agents of natural origin

- **Direct antimicrobial preservatives**

- **Indirect antimicrobial preservatives**

iv) Antioxidants

Need For Preservation

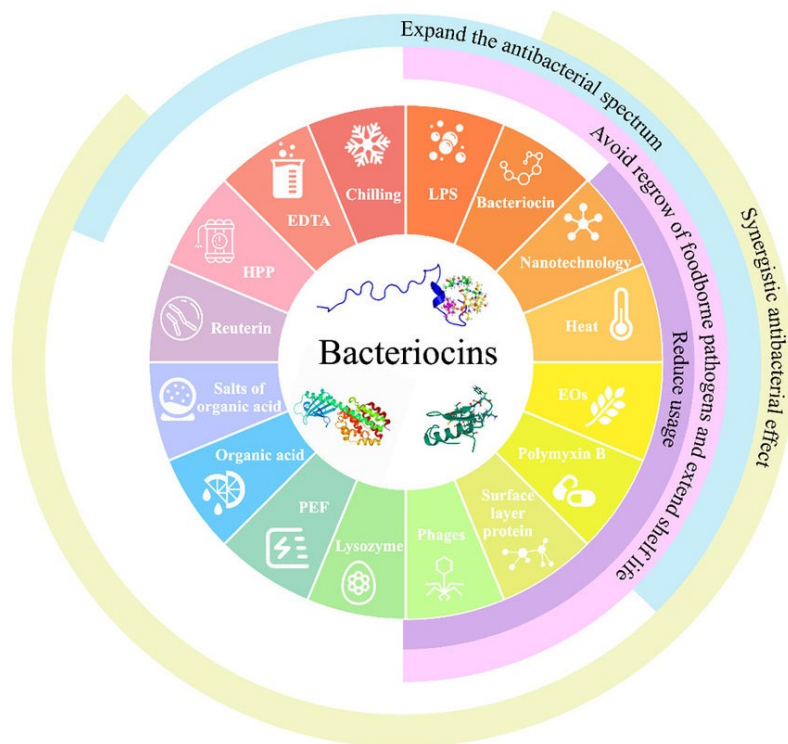


- Economic advantages
- Longer Shelf life
- Enables longer transport
- Reduced demand and cost
- Safe food for consumers



Preservation

Food Preservation is the process of treating and handling food to stop or greatly slow down spoilage (loss of quality, edibility or nutritive value) caused or accelerated by micro-organisms.

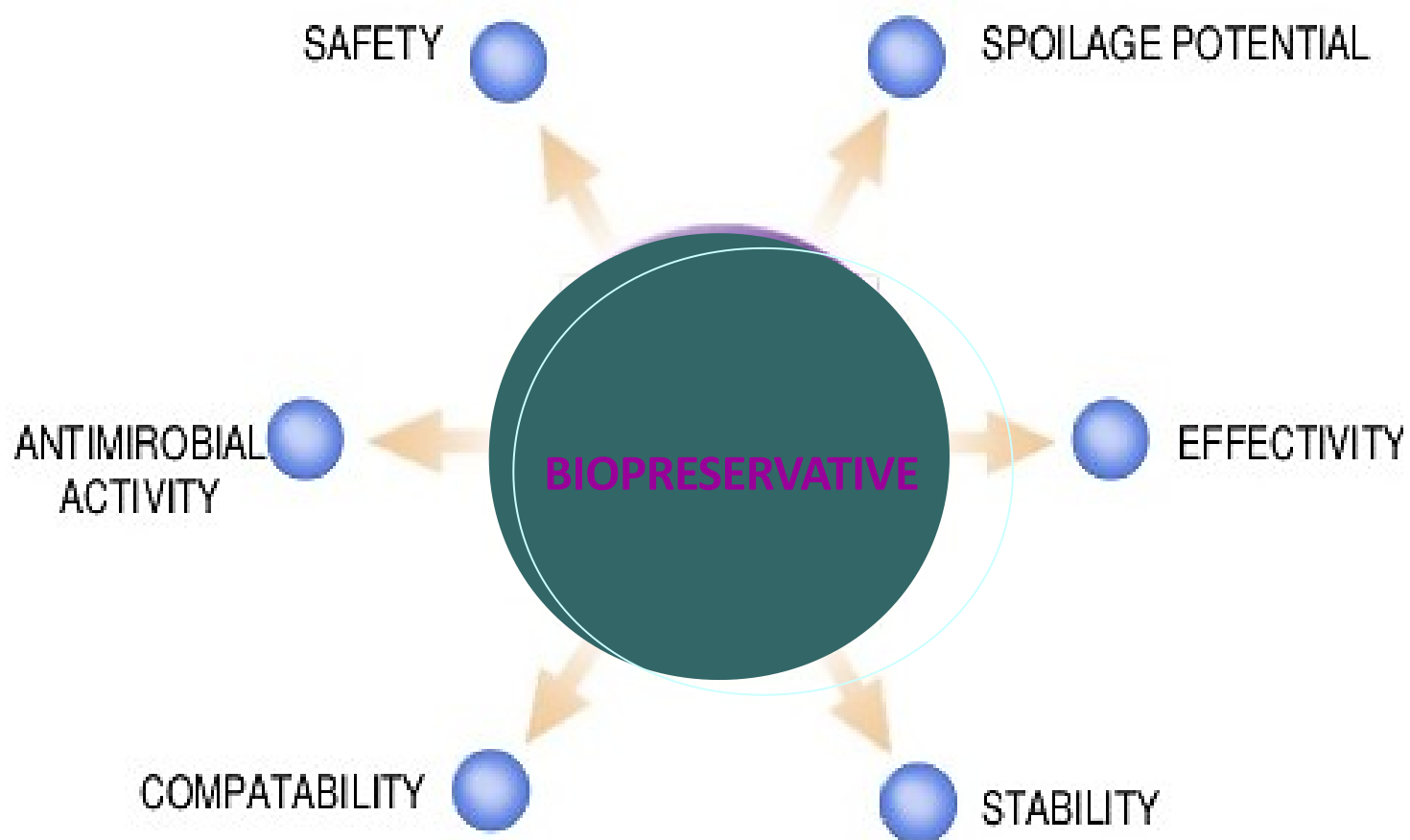


Biopreservation

- **Bio-preservation** is the rational exploitation of antimicrobial potential of naturally occurring chemical compounds or micro-organisms and/or their metabolites in food for its extended shelf life.
- Any agent used for biopreservation can be termed as **Biopreservative**.

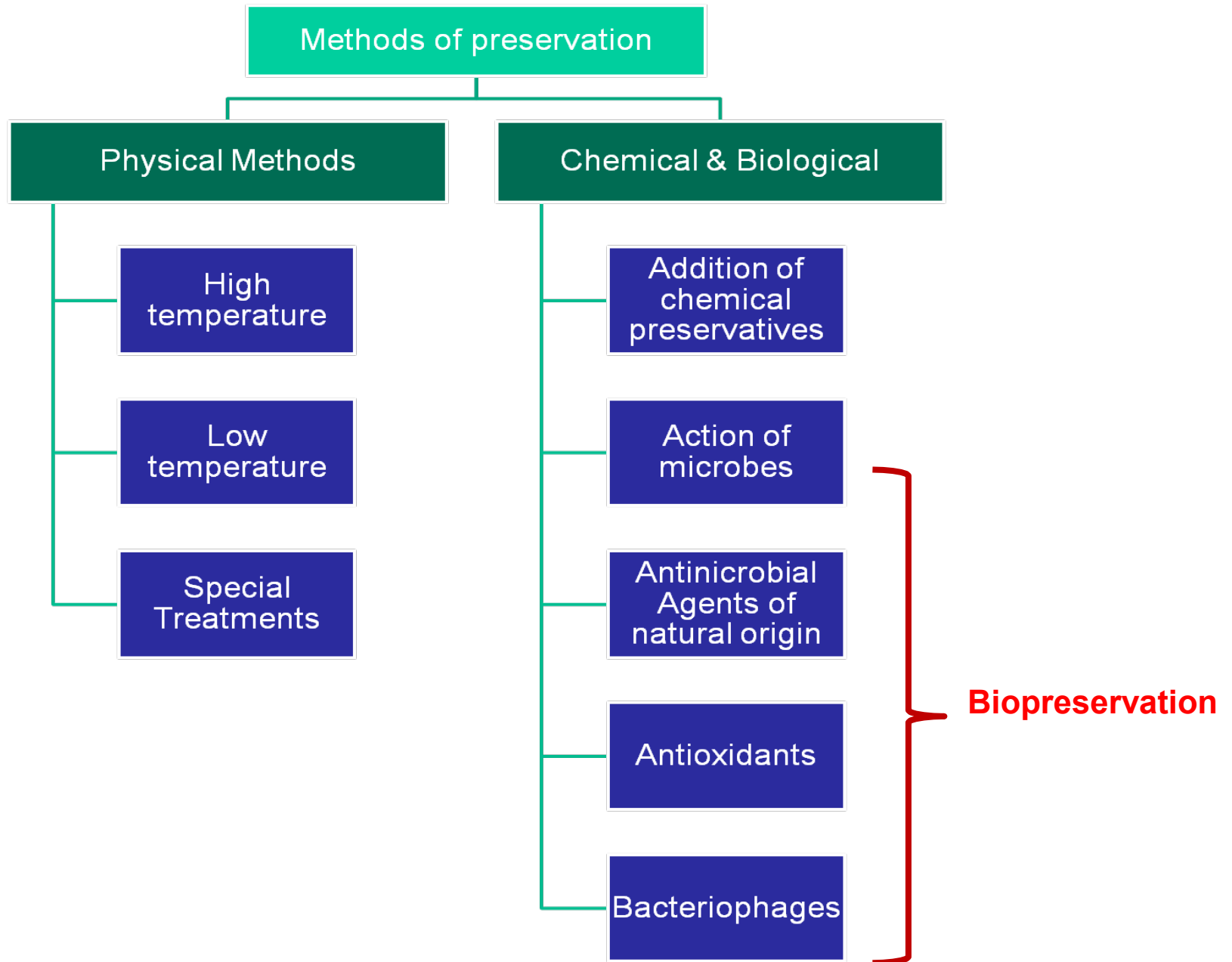


Features of Biopreservative



Huge call for Bio-preservatives

- **Health concern** : Ill effects of currently used preservatives.
- **Taste preference** : People prefer less acidic foods.
- **Urge for 'Natural products'**.
- **Ethical issues**: Organic products being preferred.
- **Convenience** : “practically home made”



Methods of Preservation

A) Physical methods of preservation (Heat and Energy)

- **Hight temperature**
- **Low temperature**
- **Special Treatments**

B. Chemical & Biological Methods

Chemical & Biological methods of preservation

a) Addition of chemical preservatives

- Benzoic Acid
- Sodium benzoate
- Salt & Sugar
- Potassium metabisulphate(KMS)

b) Action of microbes

i) Bioprotective Cultures

- **Use of fermentative microorganism to preserve food**
- **Directly inhibit spoilage organism/ pathogen or inhibit toxin formation.**
- **Lactic acid bacteria**

ii) Fermentates

- Fermentates are fermented food ingredients.
- Produced from variety or raw material and fermentation is done using food grade microbes
- Fermentates are usually supplied as a dry, cell free powder
- **MicroGARD** Fermentates of Du-pont
- DuraFresh of **Kerry**

Product & Label	Active pH Range	Gram Positives	Gram Negatives	Yeast & Mold	Key Benefits
DuraFresh™ 5015, 5011 (powder) 5015 – Cultured Grade “A” Skim Milk 5011 – Cultured Corn Syrup Solids	<6.0	✓	✓	✓	<ul style="list-style-type: none"> Naturally derived fermented ingredient Standardized to a consistent level of organic acids and/or peptides Easily dispersible Can be applied pre-heat treatment and used with all types of processing equipment
DuraFresh™ 5904, 5924 (powder) 5904 – Cultured Dairy Solids 5924 – Cultured Corn Syrup Solids	<6.5	✓			
DuraFresh™ 7000 (liquid) 7000 – Cultured Dextrose	<6.0	✓	✓	✓	
Accel™ 2000 (powder) Natural Flavor	<8.0	✓	✓		<ul style="list-style-type: none"> Preservation Color retention agent Standardized to achieve consistent dosage and performance of sodium nitrite equivalent Pre-converted nitrite (no hold time) Easily applied to standard processes No fermentation expertise necessary
Accel™ 2000H (liquid) Cultured Celery Juice	<8.0	✓	✓		
AM-3 (water soluble liquid) Natural Liquid Smoke Flavor or Flavoring	<8.5	✓	✓	✓	<ul style="list-style-type: none"> GRAS, USDA and FDA approved Applied as a topical or surface treatment, or incorporated into the product Activity over a wide pH range Allergen & GMO free No special handling or storage conditions

Product	Benefit	Application
MicroGARD® 100	Anti-Gram-negative bacteria Anti-yeasts and molds Cultured skim milk-based	Yogurts, cottage cheese, sour cream, dairy desserts, fresh cheese (quark), filled chocolate confections
MicroGARD® 200	Anti-Gram-negative bacteria Anti-yeasts and molds	Sauces, dressings, pasta, side dishes, baked goods inc. fruit applications
MicroGARD® 300	Anti-Gram-positive bacteria Cultured skim milk-based	Cottage cheese, flavored dairy drinks, custards and dairy desserts

c) Antimicrobial agents of biological origin

i) Direct antimicrobial preservatives

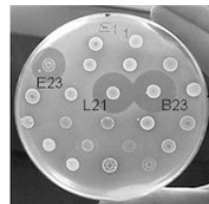
- **Bacteriocins** produced by microorganisms are used to make preservative effect.
- Microbes produce wide range of such chemicals
- Nisin, Natamycin etc.
- **Antibiotics** produced by microbes like *Penicillium*
- **Essential oils** of spices

ii) Indirect antimicrobial preservatives

- Some additions in food for purposes other than preservation gives preservation effect.
- **Flavouring agents**- diacetyl and carvon acts against G- ve bacteria
- **Polyphosphates** – case study shows *C.sporogenes* are inhibited.
- Mode of inhibitory actions are reversible

Antioxidants

- ✓ Used to prevent oxidation in foods, packages (rancidity of oils and fats)
- ✓ Antioxidants helps up preventing CVD diseases, cancer, ageing
- ✓ Synthetic: BHT, BHA, Tocopherols Antioxidants from natural sources are being explored.



Listeria monocytogenes



ECOFRIENDLY



BACTERIOCINS from L.A.B.

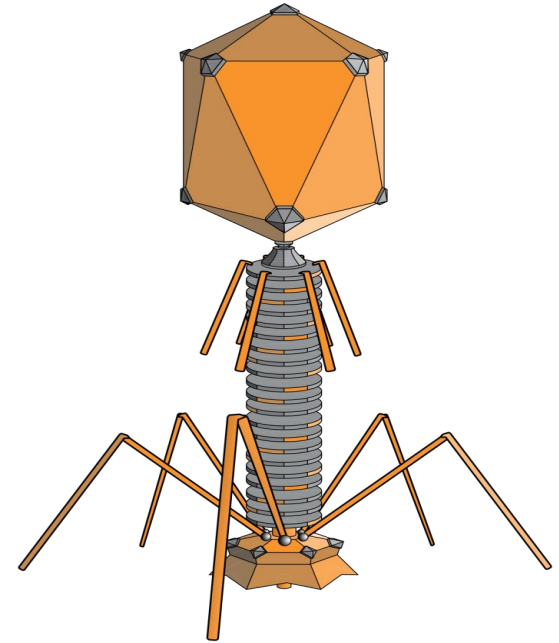
SAFE

BIOPRESERVATIVES
CHEMICAL ADDITIVES



Bacteriophages...

- Virus that attack Bacteria can be used as antibacterial.
- Need further research for wide application
- Oral treatment of broilers with phages reduced the carriage of Salmonella



Thank You...

