EDIBLE PACKAGING

Objectives

- An introduction to edible packaging and their uses.
- Need of edible packaging in our day to day life.
- An Overview on application of Edible films
 & coatings in food industry.

Why do we need edible packaging?

• U.S. Environmental Protection Agency says that every year 1.6 million metric tons of **packaging waste is dumped** into landfills in U.S.

• packaging waste is app. 30% of municipal waste by weight, 13% is due to plastic material which is **not bio-degradable**.

• This dumped packaging includes mainly plastics which reduces moisture and O₂ transfer rate of soil and deteriorates the quality of land

• Plastics are non-biodegradable and they are the biggest threats to environment in present world

• Edible package can be the solution to these **environmental problems**.

What is an Edible Packaging?

• An edible film or coating is simply defined as a thin continuous layer of edible material formed on, placed on, or between the foods or food components.

• The package is an integral part of the food, which can be eaten as a part of the whole food product.

HISTORY OF EDIBLE FILMS AND COATINGS

Edible coatings have been used for centuries to protect foods and prevent moisture loss.

The first recorded use was in china in the 12th century on citrus, and later in England using lard or fats, called larding to prolong shelf life of meat products.

Since the early to mid 20th century, coatings have been used to prevent water loss and add shine to fruits and vegetables, as casings using collagen or collagen-like material for sausages, and as some sort of sugary coatings on confectionaries, including chocolate.



Edible films

• Edible films are produced (e.g. by casting, extrusion, compression moulding,) and only then applied on foods



•Edible coatings are applied and formed directly on foods (e.g. by spraying, immersion, fluidization) *via a coating-forming solution;*

•Edible coatings will be part of the food and must therefore provoke no unwanted changes (organoleptic, physical, chemical).











2-Different forms.

i. Edible coating :





ii. Edible Films



Principals of film formation

1.Cohesive forces between polymers molecules: Here cohesive forces between same polymer molecules are responsible for barrier properties of filmes.

2.Adhesive forces between film & substrate: Here adhesive forces between film & substrate are responsible for formation of intact.

Mechanism of film formation

• Simple co-acervation: in this mechanism a hydrocolloid dispersed in water is precipitated or undergoes a phase change after solvent evaporation (drying), after addition of hydrosoluble nonelectrolyte in which the hydrocolloid is insoluble.

• **Complex co-acervation: here, two hydrocolloid** solutions with opposite electron charges are mixed & thus causing interaction & precipitation of the polymer complex.

• Gelation or thermal coagulation: Heating of macromolecules leads to its denaturation followed by gelation or precipitation or even cooling of hydrocolloid dispersion causes gelation.

Functional Properties

- Retard moisture migration (wax coating on F&V)
- Retard gas (O2 and CO2 permeability)
- Retard solute transport
- Retard oil and fat migration
- Improves mechanical handling properties of food
- Retain volatile flavor compounds
- Carry food additives
- Can enhance nutritive value of food
- Layers are not self supporting

Advantages of edible films

- Environment friendly, as fully consumed or biodegradable ,recyclable.
- Reduce the waste & solid disposal problem.
- Enhances organoleptic properties like color, sweetness etc
- Enhances nutritional values by supplementation
- Individual packaging is possible for fruits like strawberry.
- Film can be used as interface between the layers of heterogeneous foods to prevent deterioration
- Film can work as carrier anti microbial or antioxidant agents
- Film can be used as micro encapsulation of flavoring agents.



COMPONENTS OF EDIBLE COATINGS

Polymers are the main ingredients of many edible coatings. Many edible polymers are nontoxic, simple derivatives of cellulose, one of the most abundant natural polymers in nature, being a component of plant structure.

The coatings made from polymeric edible films are generally designed to be flexible and tough.



Requirements to consideration

- Edible coatings should have an acceptable colour,odour,taste,flavour & texture.
- Edible coatings should be undetectable
- It must adhere to the food, but not stick to the packaging materials.
- It should melt in mouth, but not in hands.

Edible packaging - Polymers of plants origin



Edible packaging - Polymers of animal origin



Use of Edible Films and Coatings

- 1. Reduce water loss
- 2. Reduce gas diffusion
- 3. Reduce movement of oils and fats
- 4. Reduce movement of solutes
- 5. Reduce loss of volatile flavors & aromas
- Improve structural properties (hold it together)
- Incorporate pigments, flavoring, & food additives
- 8. Improve appearance (e.g., gloss)
- 9. Inhibit transfer of moisture and oxygen
- 10. Reduced mold growth
- 11. Reducing frying fat uptake
- 12. Reduce adhesion to cooking surface.



Safety & Health issues

- An edible film to be used in food should be generally recognized as safe (GRAS) by the FDA.
- If the material cannot be demonstrated to be GRAS, then manufacturer must submit a food additive petition to the FDA.
- There should be a declaration about the type of edible materials some individuals are allergic to certain polymers.

Ice cream cone



Three main dry ingredients compose all types of cones.

Wheat flour, tapioca flour, and sugar are chosen for baking quality, strength, and relative sweetness, respectively.

- Wet ingredients (and others added with the wet materials)
- ✓ include water,
- ✓ shortening (edible fat or grease),
- baking powder (a dry ingredient but one that begins to react as soon as it is mixed with water so it is added last to avoid contact with any moisture in the air),
- ✓ coloring, flavoring, and salt.

Both the coloring and flavoring are natural products made by outside specialists.

Drawbacks of Edible Packaging

- The edible wraps would not be used alone where unsanitary conditions during food handling can occur
- They would be used to wrap foods inside a secondary synthetic package during food distribution and storage
- The new wraps are more expensive than synthetic packages. However, developers believe the nutritional and environmental advantages will justify the increased cost
- Development of off flavour.
- Poor mechanical properties.

Conclusion

- It is very useful in our day to day life
- It is also the best option to protect our environment by substituting it with Polyethylene
- However, further researches are required to be done

Edible plates & spoons





















Ideas for the future

• Edible fruit and vegetable wraps that enhance nutrition for food products could make healthy foods more attractive to consumers

- Fruit and vegetable films could also be used to cover leftovers for short-term storage in the refrigerator
- Edible films could provide new flavor combinations.