MINISTRY OF FOOD PROCESSING INDUSTRIES
GOVERNMENT OF INDIA

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

WAXY RICE -PACKAGING

AATMANIRBHAR BHARAT

PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)

PACKAGING REQUIREMENTS

DEFINITION OF PACKAGING

- Packaging can be defined as a method to protect and contain foods with the aim of minimizing the environmental impact of our consumption.

- The Packaging Institute International (PII) defines packaging as the enclosure of products, items or packages in a wrapped pouch, bag, box, cup, tray, can, tube, bottle or other container form to perform one or more of the following functions: containment, protection, preservation, communication, utility and performance. If the device or container performs one or more of these functions, it is considered a package.

FUNCTIONS OF PACKAGING

- Packaging materials have the four basic functions of providing protection, communication, convenience and containment.

- Traceability and tamper indication are said to be the secondary functions of increasing importance.

FUNCTIONS OF PACKAGING

1. Protection:

One of the main objectives of the packaging of food is to protect it against spoilage or deterioration due to physical damage, chemical changes or biological damage.

2. Communication:

Any special instructions or information.

3. Convenience:

Ease of access, handling, and disposal; product visibility.

4.Containment:

Hold the contents and keep them secure until they are used.

FUNCTIONS OF PACKAGING

5.Traceability:

Ability to track any food through

all stages of production, processing and distribution.

6.Tamper indication:

- Food tampering is the intentional contamination of a food product, with intent to cause harm to the consumer or to a private company (Canadian Food Inspection Agency, 2010).
- There are several measures to detect tampering, including banding, special membranes, breakaway closures, special printing on bottle liners or composite cans such as graphics or text that irreversibly changes upon opening and special printing that cannot be easily duplicated (Marsh and Bugusu, 2007).

FUNCTIONS OF PACKAGING

7.Packaging as a Marketing Tool:

- Packaging is an important tool for advertisement.
- Packaging protects the interests of consumers.
- The information on the packaging includes quantity, price, additives, ingredients, inventory levels, lot number, size and weight is very important for merchandising.

8.Socioeconomic Factors in Food Packaging:

- The use of food packaging is a socioeconomic indicator of increased spending ability of the population, an increase in the gross domestic product or an increase in food availability.

- Packaging technology must balance food protection with other social and environment issues, including energy and material costs, heightened social and environmental consciousness, and strict regulations on pollutants and disposal of municipal solid waste.

PACKING CONSIDERATION AND SELECTION

- Choosing packaging materials for rice products should be related to the major indices of failure of rice products , which include loss of crispness, lipid oxidation, and nutrient loss.
- Protection against environmental conditions like humidity, temperature, etc.
- The packaging material should be able to withstand mechanical hazards during transportation and facilitate stacking several tiers high so as to optimize the use of available space.
- To protect the contents from spillage. To protect the contents from insect infestation.
- To protect from external odor. Easy to handle. Economical and easily available.

TYPES OF PACKAGING

Paper, paperboard, and printed fiberboard

- Most cereals are packaged with paper-based materials made from wood fibers.
- Microflute corrugated paperboards have unique characteristics including good strength properties, excellent shock absorbing ability, good aesthetic appearance, environmental advantages, and distinctive print properties.
- White board is suitable for contact with food and is often coated with low density polyethylene (LDPE), poly(vinyl chloride) (PVC), or wax. It is used for snack, chocolate, and frozen food cartons.
- Different types of cereal based products are packed in paper based materials. The major products include weaning foods and breakfast cereals.

PLASTIC FILM

- Flexible plastic films have been used for cereals in single packaging or multi-serving size packages with other packaging materials.

- Biaxially oriented films are most widely used, as it has qualities of toughness (against puncture and abrasion) and clarity, and is rendered heat sealable by coextrusion or coating with polyolefin copolymers.

- Films are also coated with other polymers or aluminum to improve the barrier properties or to impart heat sealability. Other films include: LDPE/LLDPE films, High Molecular High Density Polyethylene films.

- Laminates made from BOPP/LDPE, Cast Polypropylene (CPP)/LDPE, Polyester/ LDPE are used in few branded commodities. Although laminates are essential for expensive products like Basmati rice where the flavor retention of the product is very important.

- Major cereal products packed in plastic films are rice, flour etc.

METALS

- Metal containers have been rarely used for rice and rice products due to their cost, despite their perfect gas barrier properties, convenience, and extreme strength.

- Aluminum cans are most commonly used. Many commodities are easily affected by sunlight, which damages their appearance and worsens their taste.

- Aluminum solves this problem in the best way possible which is why it is generally regarded as the ideal core packaging material for food.

- Aluminum is non-toxic, so it does not damage the foods packed in it, but instead protects them. Most commonly packed rice based based product in aluminum cans are RTE rice product.

METHODS OF PACKAGING

ASCEPTIC PACKAGING:

- Process in which a food product, such as ultra high temperature (UHT) milk and its package is sterilized separately and then combined and sealed under sterilized atmosphere.
- It increases the shelf-life.

VACCUM PACKAGING:

- It is a procedure in which air is drawn out of the package prior to sealing but no other gases are introduced.
- This technique has been used for many years for products such as cured meats and cheese.

METHODS OF PACKAGING

Modified Atmosphere Packaging

- Modified atmosphere packaging (MAP) is a procedure which involves replacing air inside a package with a predetermined mixture of gases prior to sealing it.

- The gases involved in modified atmosphere packaging, as applied commercially today, are carbon dioxide, nitrogen and oxygen.

- Carbon dioxide reacts with water in the product to form carbonic acid which lowers the pH of the food. It also inhibits the growth of certain microorganisms,mainly moulds and some aerobic bacteria.

- Nitrogen has no direct effect on microorganisms or foods, other than to replace oxygen, which can inhibit the oxidation of fats.

- Oxygen is included in MAP packages of red meat to maintain the red colour, which is due to the oxygenation of the myoglobin pigments.

BIODEGRADABLE PACKAGING

- According to the ASTM,2003 guidelines, a "biodegradable plastic" is defined as a degradable plastic in which the degradation results from the action of naturally occurring microorganisms such as bacteria, fungi and algae.

- Biodegradable or green packaging must satisfy some basic requirements to be an ideal candidate for food packaging.

- These requirements include barrier properties (to water vapor, gases, light and aromas), optical properties (transparency), strength, welding and molding properties, printing properties, migration resistance, chemical and temperature resistance, the ability to satisfy disposal requirements, antistatic properties, and the ability to retain sensory properties.

USE OF VARIOUS PACKAGING LAMINATES/COMPOSITES

Materials	Properties	Use
9 mm foil / adhesive / paper coated with heat sealing vinyl resin	Good moisture barrier, runs well on machine	Over wraps confectioneries
9 mm foil / adhesive / paper / polyethylene (extruded)	Good moisture barrier, runs well on machine	Fin-sealed pouches and sachets – soups, etc.
1 in. polyethylene / 9 mm foil / adhesive / paper	Heat seals by the wax bleeding through the tissue	Over wraps for confectionery
9 mm foil / adhesive / paper / micro-wax comp. / tissue (20 g/m2)	Low WVTR	Over wraps for biscuits, etc.
Foil	Excellent WVTR, good machinability	Candy wrap, biscuit wrap
Cellophane / wad / cellophane	Excellent WVTR, sandwich printing, good machine performance	Bags or pouches for hygroscopic items
Cellophane / adhesive / pliofilm	Excellent gas barrier, transparent pack	Nut packing with inert gas
Cellophane/polyethylene	Excellent gas barrier, trapped printing	Chocolate, etc.
Polyester film / Saran coated polyethylene	High strength, positive sealing	Vacuum food Pouches
Polyester / adhesive / foil / polyethylene	Excellent gas barrier, good heat resistance, good rigidity, aroma retention	Flexible processable cans

BULK PACKAGING

- Cereals are sold mainly in bulk quantities.
- The requirements for bulk packaging are therefore, most important for these commodities.
- The packaging materials used for bulk packing of cereals are as follows: Jute Bags Woven sacks made out of high density polyethylene or polypropylene Multiwall paper Sacks

RICE PACKAGING

- Rice is the predominant staple food all around the world.
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- Moulds are the important microbes associated with cereals during growth, harvest, storage and shipping.

- Good storage conditions and packaging are the key plugs to keep rice fresh as spores only germinate if the moisture, temperature and oxygen levels are optimum.

- Moulds cannot grow in rice grains below 14% moisture. Warm conditions also encourages fungal growth.

- They are mostly available in plastic bags. The other forms of packaging include plant fibre bags (jute, cotton, and sisal) which are mainly used for bulk packaging.
  Flat Bottom Window Tear Notch Side Gusset

RICE PACKAGING

- Stand up pouch packaging is the modern version of flexible packaging. The style of this packaging is mainly in a box form.

- The pouch has a very flat bottom surface and when it is filled it balances straight up, unaccompanied.

- The pouch also has left and right side gussets. Material forms used during the production process of these bags include; Plastic, PET, BOPP, PE or Foil aluminum.

- All these materials contribute to the durability and flexibility of stand up pouch bag packaging designs.

- The thickness and capacity of packaging material depends upon type of product. Normal thickness of packaging material for rice is 80-200 microns. PET PE BOPP

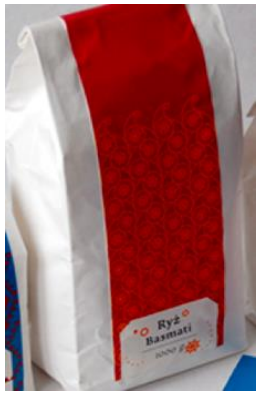
RICE PACKAGING

Jute Bags

Flexible Packages

Paperboard Laminates

Polypropylene Woven Bags



Plain Paper

Cardboard Box

Non Woven Bags

POHA PACKAGING

Jute Bags

Flexible Packages

Paperboard Laminates

Polypropylene Woven Bags

Plain Paper

Cardboard Box

PP Cups

INSTANT DRY MIXES PACKAGING

- These food have very low moisture and ERH.
- They have the tendency to absorb moisture from the surroundings and turn soggy, thereby, loosing their crisp, brittle nature and taste.
- The most important factor to be considered, is moisture vapour transmission rate (MVTR) of the packaging materials used. MVTR values of less than 1 gm / m-square / 24 hours are required.
- Flavour and essential oils contribute to the organoleptic qualities of many RTC food. They are volatile substances and hence gas permeability of the packaging material should be very low to prevent flavour loss.

INSTANT DRY MIXES PACKAGING

READY TO EAT (RTE) RICE PRODUCT PACKAGING

Convenience food is categorised into

- Ready-to-Eat (RTE) and Ready-To-Serve (RTS) food - e.g. Idlis, dosas, pav bhaji, meat products like pre-cooked sausages, ham, chicken products, curries, chapattis, rice, vegetables like aloo chole, navratan kurma, channa masala etc.

- Ready-to-Cook food – e.g. instant mixes like cake mixes, gulab-jamun mix, falooda mix, icecream mix, jelly mix, pudding mix etc., pasta products like noodles, macaroni, vermicelli etc.

READY TO EAT (RTE) RICE PRODUCT PACKAGING

- Ready-to-use retort pouches are flexible packages made from multilayer plastic films with or without aluminium foil as one of the layers.
- Unlike the usual flexible packages, they are made of heat resistant plastics, thus making them suitable for processing in retort at a temperature of around 121°C.
- These retort pouches posses toughness and puncture resistance normally required for any flexible packaging.
- It can also withstand the rigours of handling and distribution. The material is heat sealable and has good barrier properties.

READY TO EAT (RTE) RICE PRODUCT PACKAGING

- In India, 3-ply laminate consisting of PET/Al Foil/PP is commonly used for packaging of ready to eat retort packed food.
- The product packed in such laminates has a shelf-life of one year. The other materials generally used in retort pouch structure includes nylon, silica coated nylon, ethylene vinyl alcohol (EVOH) and polyvinyledene chloride (PVDC).
- These materials have high moisture barrier properties and are used successfully for packaging of ready-to-eat high moisture Indian food.

READY TO EAT (RTE) RICE PRODUCT PACKAGING

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