STORAGE STRUCTURE

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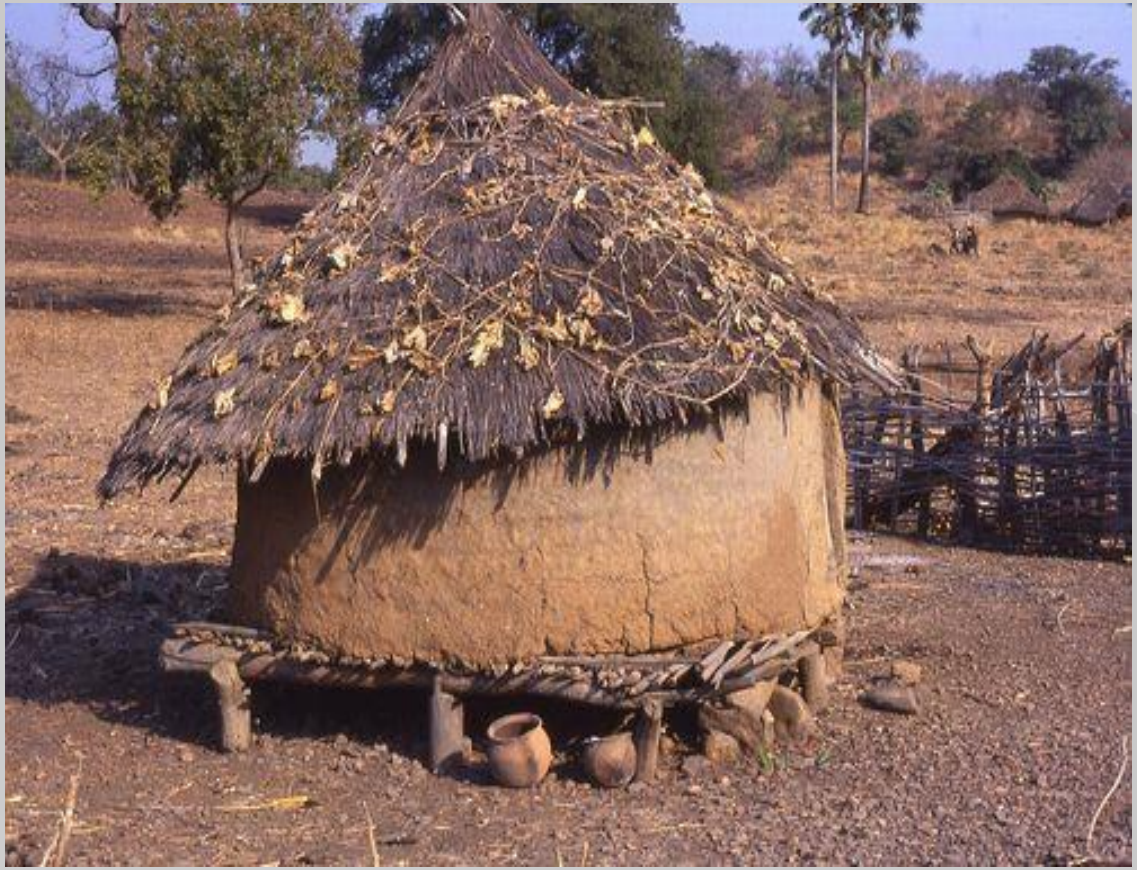
STORAGE STRUCTURES

The selection of storage structures depend on the

- production level
- Cultural practices and
- the climatic conditions

TYPES OF STORAGE STRUCTURES



TYPES OF STORAGE STRUCTURES

Broadly, storage structures are classified as:

- Traditional Structures:
  - Small sized and short term.
  - high level of infestation.
  - They are mostly made of unrefined local materials.

- Modern Structures:
  - Mostly large capacity and long term.
  - better regulation of the storage environment.
  - They are made of improved and refined materials.

TRADITIONAL STRUCTURES

- These are devices(System) used mostly for short term and small scale storage.
- Occasionally they include some medium term and medium scale storage devices.
- They require low level of scientific knowledge to construct, operate and maintain.
- They are mostly made of unrefined local materials

TRADITIONAL STORAGE STRUCTURES (CONTD.)

Traditional storage structures include:

- Domestic structures
- Rhombus
- Crib
- Barn
- Shelf
- Pit/ Underground Storage
- Plastic Containers

DOMESTIC STRUCTURES

- This is the family level storage practiced in household.
- They are used at household and peasant levels for the storage of grain.
- Some of the facilities used for domestic storage include guards, tin, box, basket, jute bag, polythene bag, and earthen pot, plastic or metal containers.
- Earthen pots are equally used for storage of rice in our rural area.
- It is advisable to cover the tin used for domestic storage of grains.
- The open end of polythene bag should also be tied. This is to ensure air-tight.
- Oxygen circulation is minimized and this retards the activities of insects.
- Products stored in domestic structures are preserved with powdered pepper.
- It is not advisable to store domestic food stuff with chemicals.

EARTHEN POTS

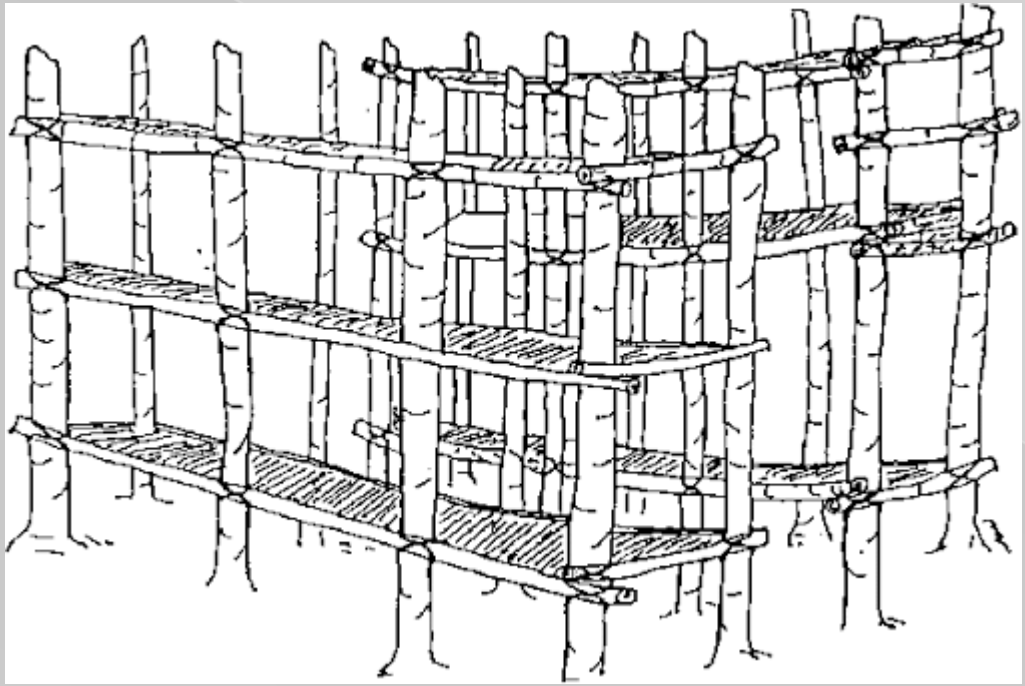
RHOMBUS AND TRADITIONAL CRIB

Rhombus & Traditional Crib

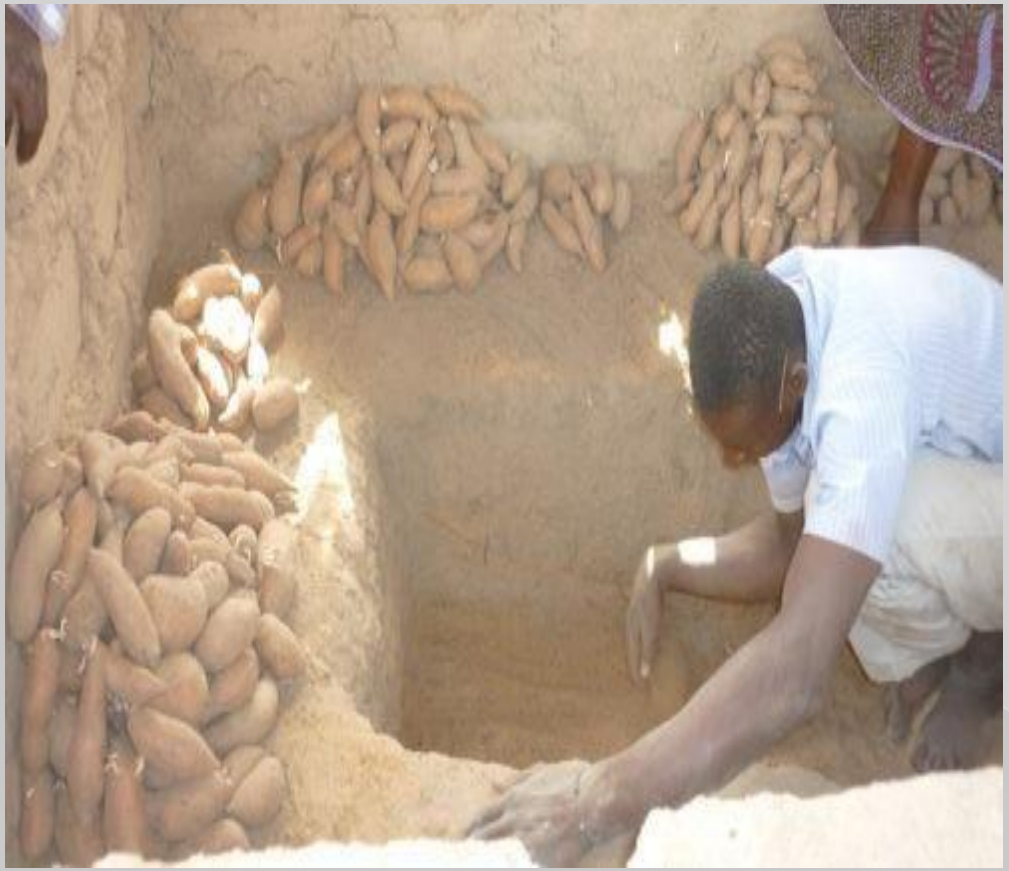
- These are used for grain storage, mostly materials in cob.
- Rhombus and traditional crib is used in rural area in Bangladesh.
- Rhombus is cylindrical in shape while crib has rectangular shape.
- They are made of palm font leaf, clay, tree stem and bamboo, paddy straw.
- Major disadvantages are moisture build as a result of rain, and micro organism infestation.
- Sometimes coal or wood heat is introduced at the lower base to ensure drying.
- Grains stored in traditional storage structures are not properly protected from rain.
- Micro-organism infestation is common in the traditional storage.
- Drying rate is also retarded in the traditional storage.

BARN

SHELF



Pit



BARN, SHELF AND PIT

- These are mostly used for root and tuber crops.
- Barn and shelf could be suitable for onion & carrot.
- Barn, shelf and pit are recommended for cassava, yam and cocoyam.
- These storage structures are affected by environmental conditions
- Pit/ underground structure is the commonest storage recommended for root crops such as cassava and yam tuber.
- The walls of the pit are lined with nylon or straw.
- The products are properly packed in the pit and insulated from each other with saw dust.
- Pit storage conserves the moisture of stored product.
- It is advisable to store cassava in the pit with its stem.
- Bruised tubers and cassava must not be stored in pit. Tuber crops are highly perishable.
- Underground storage is therefore a short-term.

BARN, SHELF AND PIT

- Shelf is an improved storage for root crops.
- Root crops could be stored on shelf for a longer time, though moisture loss is much.
- Shelf is mostly made of wood or metal. Individual shelf has up to 5 rows.
- The rows must not be overloaded and proper air circulation must be ensured.
- Shelf could also be adapted for the storage of onion, garlic.

MODERN STORAGE STRUCTURES (CONTD.)

- Modern storage structures include:
  - Improved crib
  - Ware house
  - Silo
  - Controlled atmosphere storage system
  - Refrigeration
  - Cold storage
  - Evaporative coolant system (ECS)
  - Hermetic storage and Nitrogen storage system.

Improved crib

IMPROVED CRIB

- Improved crib storage has recently grained research interest because of its potentials.
- The traditional crib storage has been improved.
- We have the conventional crib storage made of improved material such as sawn wood, iron, wire mesh, galvanized sheet, plastic roof and treated bamboo.
- The conventional crib has adequate aeration, retarded mould growth and insect infestation and the roof considerably protects stored crop from direct rainfall.
- Conventional cribs have increased capacity and could store up to 15 tons of cob maize
- This structure is an improvement over the traditional crib in terms of design, capacity, construction material and performance.
- It has upgraded the traditional crib to medium scale storage.
- Each unit can accommodate 10-20 tons

WARE HOUSE

WARE HOUSE

- Ware house is used for medium but mostly large scale storage for bagged or pilled/ bulk products such as grains, flour, etc.
- Wooden pallets are used for staking.
- Material handling and ventilation equipment's are essential.
- Prevention of roof leakage and water infiltration through the floor are most essential.
- Water proof materials are used for flooring & proper drainage important.
- Leaking roofs and cracked walls must not be allowed in warehouse.
- Bagged product are properly stacked on wooden platforms
- The floor of warehouse must be well above the ground level to prevent flooding and a solid foundation must be provided.
- Water proof materials could be constituents of the foundation. This is to prevent water seepage.
- The floor should be provided with a proper drainage.

SILO

SILO

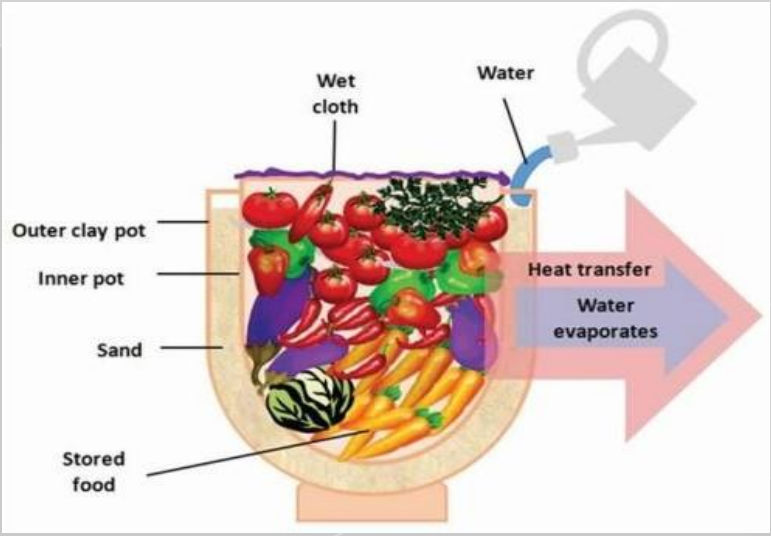
- Silo is a cylindrically shaped structure used for bulk storage of shelled grains in large scale and for long term.
- Moisture migration and condensation are major problems of silo.
- Hence, the need for accessories such as material handling and drying equipment's.
- Design, operation and maintenance of silo require high level of skill & technicalities.
- Silo is used for bulk grain storage. It is used as a large scale and long term storage.
- Silo is known to effectively store grains in the temperate regions for decades.
- Most silos are constructed of metal, aluminum, rubber or concrete. A
- to solve these problems include the provision of auger agitator and dryer; using of nitrogen atmosphere, airtight, and the introduction of insulations.
- Material handling equipments are accessories to silo storage.
- Silo is very costly.
- Some of them are monitored by computers.

Controlled Atmosphere (CA) Storage System

- Controlling of CO_2 and O_2 levels in storage
- Considerable reduction in respiration rate.
- An extension in storage life….. Even it can be doubled.
- The preservation of an excellent firmness of flesh.
- Physical alterations such as chill injuries, spot, decay, browning are prevented.
- Molds can be reduced in particular under low O_2 and high CO_2 atmospheres.
- CA is successful when only applied at low temperatures.
- Made of Gas tight metal faced insulated panels.
- Door is surrounded Rubber gasket.
- Inside atmosphere is analyzed by CO_2 and O_2 levels using Infrared gas analyzer & Ethylene analyzer.
- Low ethylene requirement – 0.2 ppm (for most of the foods).
- Srubber – for absorbing excess CO_2.

Evaporative Coolant System (ECS)

- Evaporative coolant system (ECS) is another CA storage.
- ECS utilizes the principle of “evaporation occurring at the surface of a wet material to produce cooling inside”.
- It slightly depresses temperature below and increases the relative humidity above atmospheric conditions by natural means.
- Wetted padded materials are normally used as medium of evaporation.



Hermetic Storage Structure

- It is air tight structure.
- It minimize/prevents gas exchange.
- Disallow metabolic activities of any form by the product, microorganism or insects.
- The seed must be dried to 12-14% moisture content prior to storage.
- It maintains seed quality up to 1year.

Refrigeration

- It is a popular household appliance for highly perishable food materials.

- Essential food storage technique.
- It consists thermally insulated compartment & heat pump.
- Heat pump transfers inside temperature to outside and brings low temperature inside the refrigerator than outside temperature.
- Then microbial activity and spoilage of foods reduces.

Cold Storage

- Cold storage is a CA system.
- The temperature below that of the refrigerator with the aid of R22
- gas maintain temperature below freezing point for a long time.
- It has similar components like the refrigerator but more bulky
- expensive and could store for relatively longer time.

THANK YOU