University of Ibadan
NIGERIA'S PREMIER UNIVERSITY

TRADITIONAL FOODS PROCESSING AND SAFETY

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TRADITIONAL FOOD PROCESSING TECHNIQUES

- Traditional foods and traditional food processing techniques like fermentation and sun drying date back to ancient times and are part of the culture of the people
- They constitute a vital body of indigenous knowledge handed over from generation to generation
- While traditional foods have been upgraded and are produced on industrial scale in India, Japan, China, South Korea etc., traditional foods in sub-Saharan African and many other low-and middle-income countries are still largely produced in the home and by the unregulated informal food sector with little improvement in quality and processing techniques

LIMITATIONS OF TRADITIONAL FOOD PROCESSING TECHNIQUES

- Characterised by labour-intensive, time-consuming, manual operations with limited capacity
- Invariably, the quality of the products are poor and require substantial improvements
- Women are largely involved in traditional food processing in Sub-Saharan Africa, subjecting them to considerable drudgery and, in some cases, exposing them to occupational hazards
- IUFoST 2010 Cape Town Declaration calls for "adaptation and improvement of traditional foods and processes, while respecting the traditional, ethical, cultural and religious aspects involved"
- Reducing the drudgery of traditional food processing through the introduction of simple machines would make life a lot easier for women with attendant benefits for the well-being of the family and the society at large

FOOD SAFETY ISSUES

Traditional foods are one of the leading causes of food borne diseases due to:

- **Pathogenic bacteria (*Campylobacter, E. coli, Salmonella, Listeria monocytogenes, Shigella, Vibrio, Staphylococcus*)**
- **Viruses (Norovirus, Hepatitis A)**
- **Parasites (Taenia solium, Ascaris, Trichinella, Intestinal Flukes)**
- **Mycotoxins (Aflatoxin, Citrinin, Ochratoxin, Fumonisins, Trichothecenes)**
- **Chemicals (Cyanide in cassava)**
- **The main challenges with traditional foods have to do with engineering and technology, food safety and marketing**

TRADITIONAL FERMENTATIONS

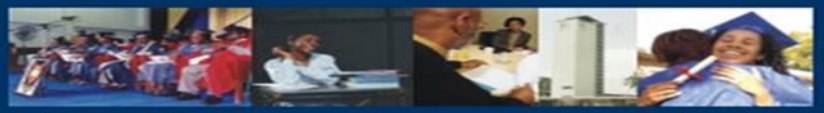
- One of the most important traditional food processing techniques
- Used for the production of a wide array of traditional fermented foods and beverages
- Convert some plant items such as African locust bean (*Parkia biglobosa*) and the woody African oil bean (*Pentaclethra macrophylla*) that are inedible in their unfermented state to edible foods through extensive hydrolysis of the indigestible components
- Detoxification e.g. cyanide in gari
- Improvements in food sensory qualities (texture and flavor)
- Improvements in food nutritional qualities (protein digestibility, vitamin synthesis)
- Some of the organisms involved are health promoting probiotics
- "Natural" technology

LACTIC ACID FERMENTATION

- Lactic acid bacteria and yeasts are responsible for the production of a wide variety of West African fermented foods including:
- Major dietary staples such as gari, fufu, lafun from cassava pulp, ogi, a breakfast cereal and weaning food, from maize, sorghum and millet, dawadawa and other condiments from a variety of substrates including African locust bean and soybean and traditional beverages from a variety of substrates including palm sap, maize, millet, sorghum, plantain, milk
- Homofermentative lactic acid bacteria produce lactic acid as the major or sole product of glucose fermentation

  $C_6H_{12}O_6 \longrightarrow 2CH_3CH(OH)COOH$
- Heterofermentative lactic acid bacteria produce equal molar amounts of lactic acid, ethanol and CO_2 from hexoses

  $C_6H_{12}O_6 \longrightarrow CH_3CH(OH)COOH + C_2H_5OH + CO_2$



GARI-AN EXAMPLE OF LACTIC ACID FERMENTATION AND DETOXIFICATION

Cassava Roots (306 mg HCN/kg)

***Peeling** (184 mg HCN/kg), (24.8 man h)

Washing (16.5 man h)

Grating (31.9 man h)

Fermenting (7.2 man h)

Pressing (52mg HCN/kg) (19.3 man h)

Sifting (96.7 man hours)

***Roasting** (218.3 man h)

Gari (10mg HCN/kg)

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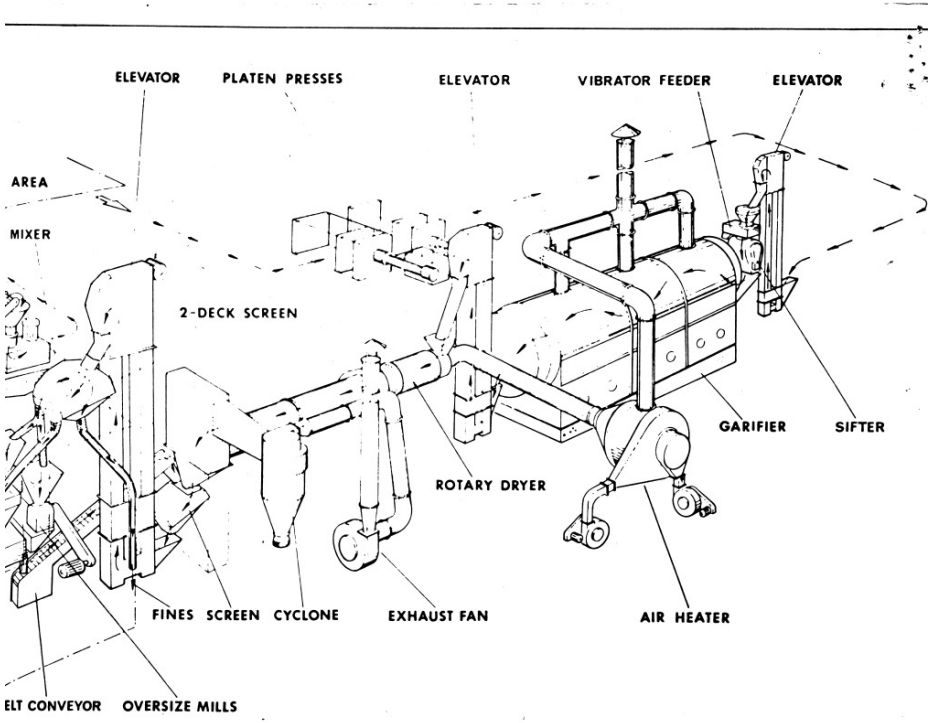
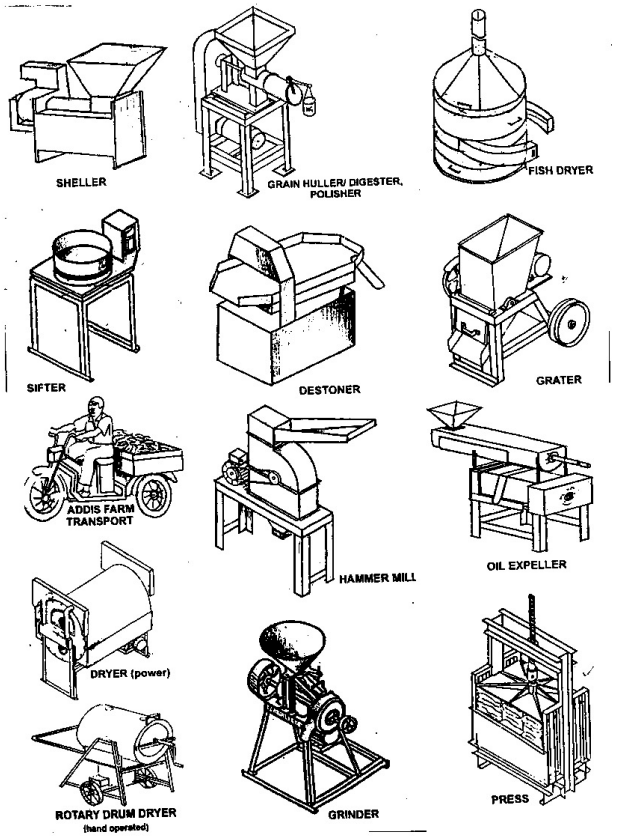
414.7 man hours per 10 tons

MECHANIZATION OF MANUAL OPERATIONS: KEY TO UPGRADING TRADITIONAL TECHNOLOGIES





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UPGRADING TRADITIONAL GARI PRODUCTION

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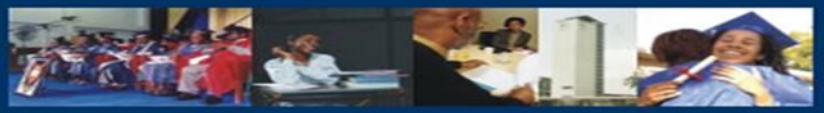
TRADITIONAL ROASTING

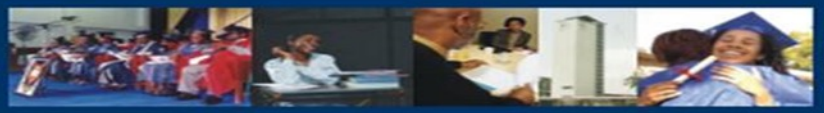
IMPROVED ROASTING



SUN DRYING

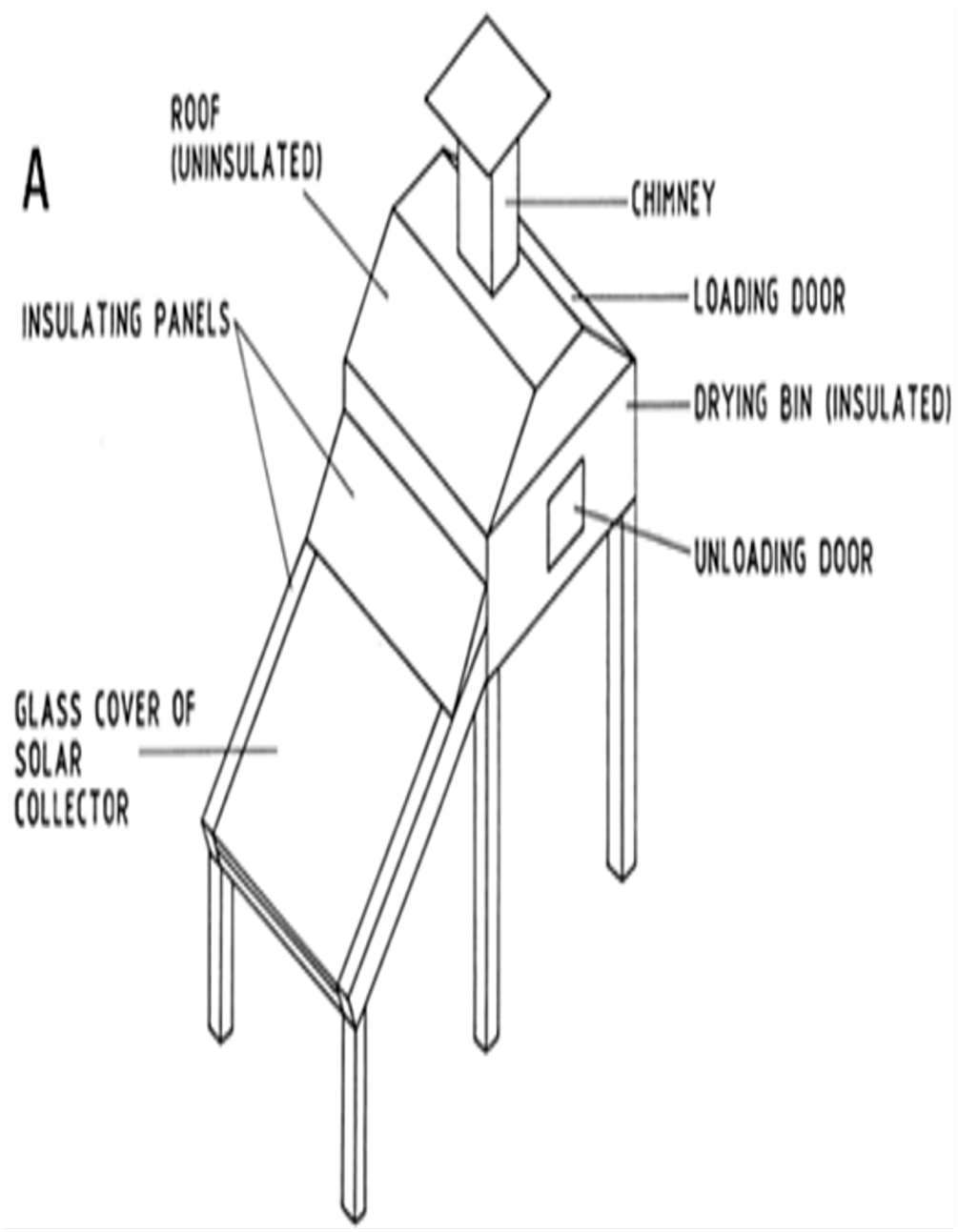
- One of the earliest methods of food preservation that is still practised in many parts of the world including Africa
- Traditional sun-dried okra, tomatoes, peppers (capsicums), onions, spices, leafy vegetables, fish, meat (ndariko, kilishi, banda) and other products are popular in West Africa
- Drying reduces weight and bulk resulting in substantial savings in handling, storage and distribution costs
- Drying inhibits biochemical and physiological changes and microbial activities, eliminating the need for costly refrigeration during transportation and storage
- Sun drying is simple and cheap; no equipment required

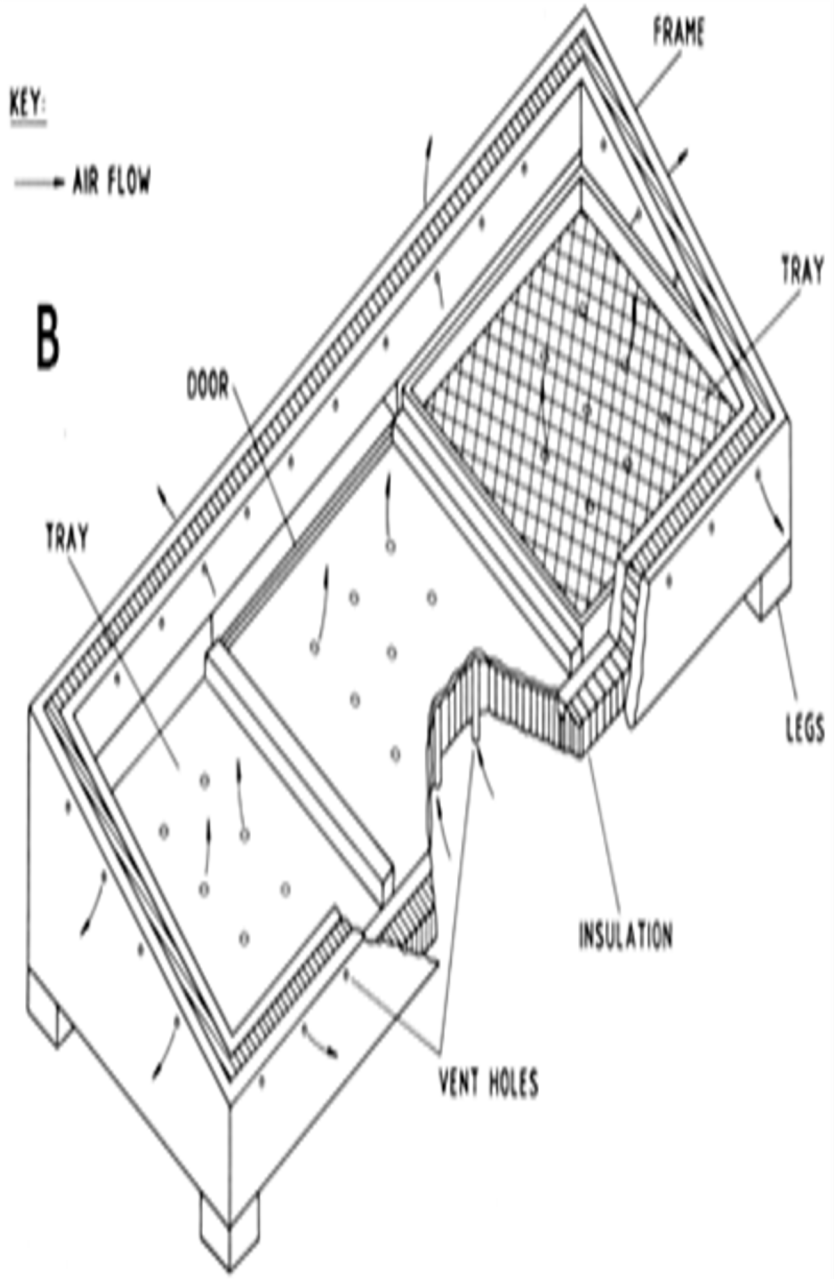
PROBLEMS OF SUN DRYING



SOLAR DRYING

- Solar drying is an improvement that eliminates the problems associated with traditional open air, shallow layer sun drying
- It is inexpensive and relatively simple to use, making it very appropriate for small-scale farmers
- Whilst solar drying is used in many parts of the world, it has not been widely used in Africa because of several constraints including potential safety risks from improperly dried and packaged foods and poor quality control including monitoring of water activity (a_w) to prevent growth of pathogenic and spoilage organisms


A
ROOF
(UNINSULATED)
CHIMNEY
LOADING DOOR
INSULATING PANELS
DRYING BIN (INSULATED)
UNLOADING DOOR
GLASS COVER OF
SOLAR
COLLECTOR

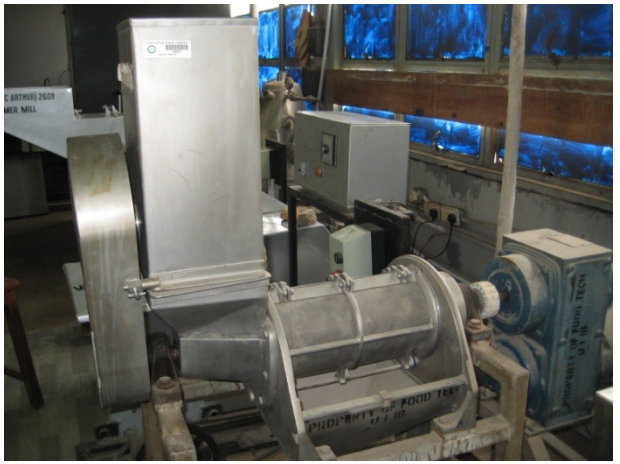

KEY:
AIR FLOW
B
FRAME
TRAY
DOOR
TRAY
LEGS
INSULATION
VENT HOLES

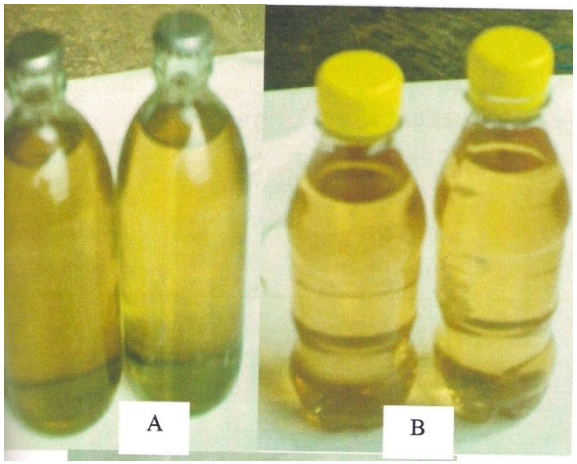
TRADITIONAL BEVERAGES

- Beverages with localized consumption, made from indigenous crops or other locally available raw materials, whose methods of production are based on traditional technologies
- Cheap; a major attraction for low-income earners
- Poor quality (sensory, nutritional, microbiological)
- Unwholesome; associated with food-borne illnesses such as abdominal cramps, dysentery and diarrhea
- Short shelf life, not refrigerated
- Methods of preparation not standardized, varies from culture to culture, crude, slow, cumbersome
- Packaged in discarded, previously used containers ; water bottles

TSAMIA: TRADITIONAL BEVERAGE FROM TAMARIND

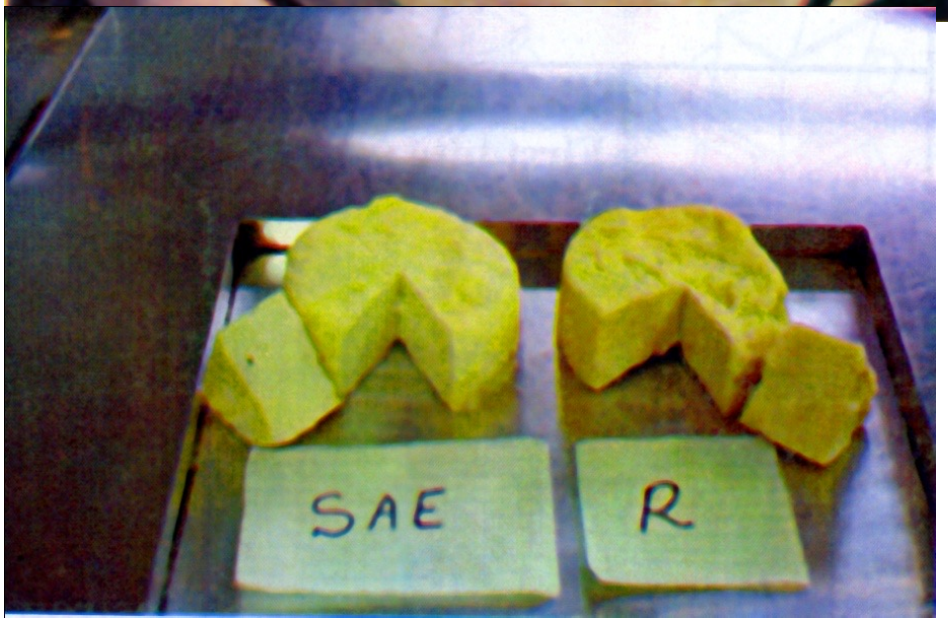
IMPROVED TRADITIONAL BEVERAGES





Establishment of food pilot plants is crucial for scaling up research on traditional foods from bench scale to industrial production

UPGRADING THE WEST AFRICAN SOFT CHEESE "WARANKASI"



Extrusion processing offers great prospects for upgrading African traditional cereal and legume food products including weaning foods and snacks such as "kokoro", a maize-based snack that is very popular in South West Nigeria

THANK YOU FOR LISTENING