MINISTRY OF FOOD PROCESSING INDUSTRIES
GOVERNMENT OF INDIA

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

PROCESSING OF PETHA



AATMANIRBHAR BHARAT

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

PETHA

- Soft & translucent candy made from winter melons (ash gourd).
- Considered the purest kind of sweet. Trademark of Agra City
- Originated in Mughal Empire under Shah Jahan's royal kitchen.
- About 1500 cottage units produce 700-800 tons of petha daily
- Very popular in Agra, Mathura and many other parts of U.P.
- Prepared by boiling Ash gourd and then processing it in syrup

HISTORY OF PETHA…..

- It is as old as the Taj Mahal
- Initially prepared for the workers who constructed the memorial.
- Earliest instances of petha were found in the royal kitchens of Mughal Emperor Shah Jahan.

PETHA FRUIT

- *Benincasa hispida (ash gourd)* also called wax gourd.
- Covered in fuzzy coating when immature
- Coating gets converted into waxy layer when ripens.
- Extensively grown in U.P, Kerala & Tamil Nadu
- Native to Java and Japan

- Ash gourd is also Called
  - Winter melon (English),
  - Petha, Petha kaddu, Kumhera (Hindi),
  - Kohla (Marathi),
  - Neer poosanikai (Tamil),
  - Kumbalanga (Malayalam),
  - Boodida Gummadikaaya (Telegu),
  - Budekumbalakayi, Boodu gumbala (Kannada),
  - Kumra, Chalkumra (Bengali), and
  - Komora (Assamese).

VARIETIES OF ASH GOURD

Major varieties of ash gourd in India are

- Pusa Ujjwal
- Kashi Ujawal
- CO-1
- CO-2
- APAU Shakthi
- MAH 1
- IVAG.502
- MHAG 2

AVERAGE NUTRITIONAL COMPOSITION OF PETHA FRUIT

Nutritional value per 100 g	
Energy	54 kJ (13 kcal)
Carbohydrates Dietary Fiber	3 g 2.9g
Fat	0.2 g
Protein	0.4 g
Thiamine (Vit B_1)	0.04 mg (3%)
Riboflavin (Vit B_2)	0.11 mg (9%)
Niacin (Vit B_3)	0.4 mg (3%)
Pantothenic Acid (Vit B_5)	0.133 mg (3%)
Vitamin B_6	0.035 mg (3%)
Vitamin C	13 mg (16%)
Calcium	19 mg (2%)
Iron	0.4 mg (3%)
Magnesium	10 mg (3%)
Manganese	0.058 mg (3%)
Phosphorus	19 mg (3%)
Sodium	111 mg (7%)
zinc	0.61 mg (6%)

HEALTH BENEFITS OF PETHA FRUIT…

- Low calorific value
- Helps to keep body cool
- Reduces constipation problem
- Good detoxifying agent
- Controls high cholesterol
- Act as a blood coagulant

ASH GOURD MARKET IN AGRA

- Collected in *mandi* or vegetable wholesale markets
- Sources are either farmers or distributors.
- Price of ash gourd are decided on daily basis
- Mainly based on the auction for the whole batch of fruit
- Generally price can be Rs. 270-310 per *mann* (40kg) during peak season
- Price hiked up to Rs. 400-410 per mann due to panedemic

PRODUCT MARKET POTENTIAL

Agra's famous petha sweet industries as well as tourism, which went into near closure, are ecstatic.

As the Taj Mahal re-opens, the petha industry has greatly benefited.

Around 50 % of sales of Petha are due to agro-tourism.

The sellers, the processor, the distributor are all directly or indirectly linked to the Petha processing business and development.

About 1500 cottage units produce 700-800 tons of Petha daily.

Presently 15 varieties of petha are manufactured in India.

OTHER RAW MATERIALS..

SUGAR

- Important Raw material
- Give characteristic hard coating
- Provide sweet taste to petha
- Three types of sugar are used :
  - Refined Mill Sugar
  - Unrefined Sugar
  - Khandsari Sugar

LIME OR CHOONA

- Chemically known as Calcium carbonate
- Used for firming of processed ash gourd

SKIMMED MILK

- Used for cleaning of sugar syrup
- Separate impurities in the form of scum
- Bind with impurities in the boiling syrup

SODIUM HYDROSULPHITE (RANGKAT)

- Colourless or white crystalline powder
- Soluble in water
- Used as souring, buffering and chelating agent
- Make petha more crispy

COLORING & FLAVORING AGENTS

- Provide characteristic color to petha
- Vary according to the petha variety
- Kesari powder IH 9140, Apple green Powder IH 8925, Orange red powder IH 7802 used in petha industry

WATER STANDARDS FOR PETHA MAKING…

Agra Groundwater Status is as:

- 7.2 for pH,
- 450 mg/L for total alkalinity,
- 7 NTU for turbidity,
- 425 mg/L for total hardness,
- 700 mg/L for chlorides and
- 1200 mg/L for total dissolved solids

PROCESSING OF ASH GOURD INTO PETHA

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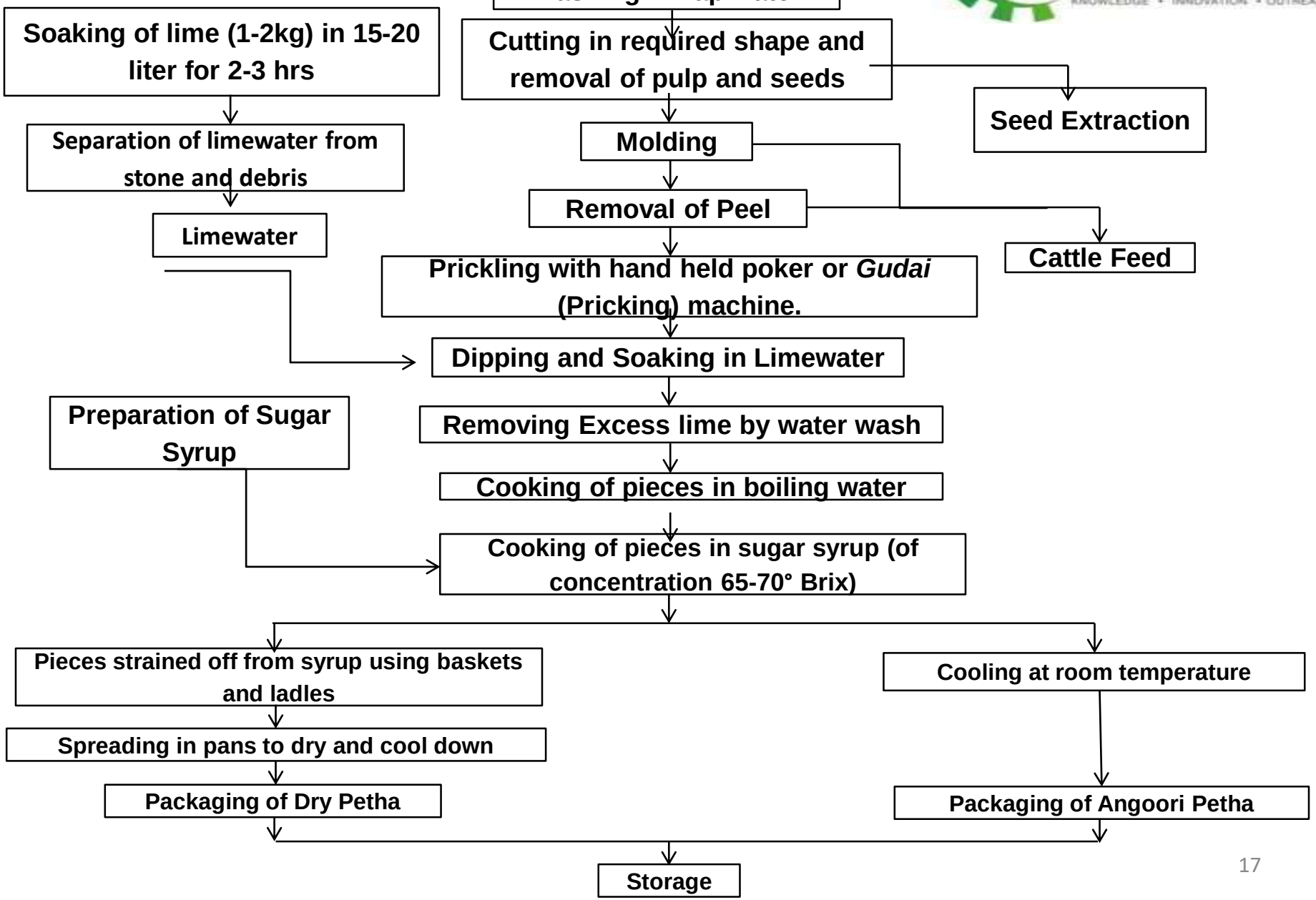

PREPARATION OF SUGAR SYRUP

- Shifting of sugar for the removal of dirt
- Mixing of water and sugar with continuous stirring
- Addition of hydro and alum to clear the syrup from scum layer
- Scum Removal using ladle
- Final concentration of syrup is 65-70° brix
- Collection in holding tank

PROCESSING STEP

- Pre-processing step
  - Preparation of sugar syrup

- Processing Steps
  - Washing
  - Drying
  - Cutting
  - Pulping
  - Slicing
  - Peeling
  - Molding and Cutting
  - Soaking
  - Boiling
  - Cooling
  - Packaging

WASHING AND DRYING

- Washing is done with groundwater
- It removes any dirt or extraneous matter.
- Spoiled, damaged and over ripened fruits also discarded
- Waste fruits further used for cattle feed
- Drying is done to remove the surface water from fruit
- Most preferable method is Sun Drying

CUTTING

- Primarily, fruit are cuts into halves to check internal spoilage.
- Further slicing is done.
- A long sharp blade knife is used for cutting of fruits
- Gloves are used to maintain hygiene and for proper grip.
- It also protects skin from irritating compounds

PULPING

- Pulp is obtained from inside the fruit after cutting
- Pulp contains seeds
- Pulping is done to separate the seeds
- Seed Extraction is done
- Sun Drying after extraction
- Uses
  - Seeds are used for next crop
  - As Cashew substitute in gravies

Pulp (With seeds)

Seeds extracted (still wet)

- Pulping machine is used to separate seeds
- Mashing is done through stainless steel blades
- Extraction due to gravitational force
- Collection of seeds at the bottom of the machine

Pulping Machine

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SLICING

- Cut the ashgourd into small pieces
- Shape of slice varies with the type of petha
- 4 longitudinal halves for dry *sada* (plain) petha
- Each longitudinal half into triangles for *pan* petha (Beetle leaf type Petha)
- Sharp edged knife is used for **slicing**

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PEELING

- Peeling is to remove green residue
- It imparts off flavor to the petha
- Contains toxin and harmful components
- Sharp edge knife is used for peeling
- Peels further used for cattle feed or composting purpose

MOLDING AND CUTTING

- Molding is done for proper shaping of petha
- Pieces are cut into desired shapes
- Simple cutters and/or pokers are used
- Pricking ensures proper seepage of sugar syrup
- Extra slices are used in making of *Gulaab Lacchha petha*
- Pieces are grated to form strands (*Lacchha*)
- Addition of rose flavor and red color

Cutting Machine

Strands (*Lacchha*)

SOAKING

- Soaking in Lime water done for 2-3 hours
- Done to provide firmness to pieces
- Lime water changed 3-4 times

BOILING

- First boiling in water for softening of pieces
- It removes excess lime and vegetable odor
- Cleaning of surface for proper syrup absorption
- Further boiling is done in sugar syrup
- Proper seepage of sugar in pieces
- Addition of flavor and color, if needed

Boiling in water

Boiling in syrup

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COOLING

FOR DRY PETHA

- Removal of excess sugar syrup prior to cooling
- Spotted ladles and baskets are used
- Transfer into trays
- Hardening of syrup on the outer surface of petha
- Transfer at wooden racks for cooling
- Cooling done at room temperature

FOR WET ANGOORI PETHA

- Two types of wet angoori petha are made:
  - Small size pieces (Cheery & Kesar petha)
  - Large size pieces (Orange Angoori petha)
- For small size, pieces are cooled in vessel with sugar syrup
- For large size, pieces are transferred in shallow trays
- Cooling at room temperature

Cherry *Angoori*

***Kesar* Petha**

***Orange* Angoori Petha**

PACKAGING OF PETHA

- Dry petha is packed in cardboard boxes
- Layer of polyethylene placed at the bottom and top of petha pieces


Dry petha

- Wet petha is packed in polypropylene pouches with sugar syrup
- Air removal from pouches is done before final sealing
- Refrigerated storage is preferred


Wet Petha

FACTORS AFFECTING SHELF LIFE OF PETHA

- Storage area should be properly ventilated
- Direct exposure to sunlight should be avoided
- Relatively low RH (20-25%) required
- Refrigeration temperature is preferred for wet petha
- Proper sanitation in storage area
- Care in post process handling

SHELF LIFE OF PETHA

Storage Type	Wet (Angoori)Petha	Dry (Sada) Petha
At Room Temperature	20-25 days	30-40 days
Under Refrigeration	30-35 days	45-50 days

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EQUIPMENTS USED

COOKING VESSEL

- Cast iron vessel
- Hemispherical shape
- Average volume ranges from 50-150 liters
- Used in boiling of water and sugar syrup

Cooking Vessel

POKER

- Can be hand-held or automatic
- Used for pricking of petha pieces
- Helps in proper seepage of sugar syrup

Poker (Hand held or Automatic)

EQUIPMENTS USED

PETHA CUTTER

- One sided sharp edge cutters are used
- Mostly triangular and circular in shape
- Shard edge knife can also be used

Petha Cutter

HEATING ELEMENT

- Traditionally coal were used
- LPG system is used for heating nowadays
- More efficient, less input required

LPG cylinders

EQUIPMENTS USED

HOLDING VESSELS

- Can be trays, silos etc.
- Used to store the sugar syrup &/or processed petha pieces

Types of Holding vessels

LIME PIT

- Depostion of lime cake
- Used in soaking of ash gourd pieces

Lime Pit

GENERAL FAILURES & REMEDIES

S. No.	General Failures	Remedies
1.	Ball bearing failure of various machine	➢Proper periodic lubrication of all bearings in various machines. ➢Regular replacement of all bearing to prevent critical failures.
2.	Power Drive Overload	➢Ensure proper weighing & metering specially in case of semi-automatic plant. ➢Install warning sensor in buffer region of loading capacity to ensure efficient operation.
3.	Mechanical Key Failure	➢Ensure that mechanical keys are replaced as per there pre-defined operational life. ➢Prevent Overloading.

GENERAL FAILURES & REMEDIES

S. No.	General Failures	Remedies
4.	Loss of Interface	➢This problem is dominant in newly established automatic plant, one must learn to maintain rules in plant & ensure no employee goes near transmission lines, unless authorized. ➢Provide proper physical shielding for the connections.
5.	Improper Boiling	➢ This basically arises due scaling within cooking kettle due to use of hard water. ➢ This problem is resolved by using appropriate descaling agent.

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NUTRITIONAL INFORMATION

Principle	Nutrient Value	Percentage of RDA
Energy	13 Kcal	1%
Carbohydrates	3g	2.3%
Protein	0.4 g	<1%
Total Fat	0.2 g	1%
Cholesterol	0 mg	0%
Dietary Fiber	2.9 g	7.6%
Vitamins		
Folates	5 µg	1.25%
Niacin	0.400 mg	2.5%
Pantothenic acid	0.133 mg	2.5%

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Principle	Nutrient Value	Percentage of RDA
Pyridoxine	0.035 mg	3%
Riboflavin	0.11 mg	1%
Thiamin	0.04 mg	3.3%
Vitamin-A	0 IU	0%
Vitamin-C	13 mg	14%
Electrolytes		
Sodium	6 mg	<0.5%
Potassium	111 mg	2.4%
Minerals		
Calcium	19 mg	2%
Iron	0.4 mg	5%
Magnesium	10 mg	2.5%
Manganese	0.058 mg	2.5%
Phosphorus	19 mg	2.5%
Selenium	0.2 µg	<1%
Zinc	0.61 mg	6%

EXPORT POTENTIAL & SALES ASPECT

- Agra's petha is so famous that varieties are available in most of the Indian markets.
- The Agra Petha industry produces 700 to 800 tons of petha every day.
- it has over 50,000 employees in over 700 small and large production plants.
- One of the very famous and most reckoned Panchhi Petha House is the oldest chain of manufacturing and exporting petha in the city.
- The preservation of variety and choice of flavor as a petha criterion is the most common export commodity for countries around the world. Research and innovations are required in the petha industry.

For More details Contact:

National Institute of Food Technology and
Entrepreneurship and Management
Ministry of Food Processing Industries
Plot No. 97, Sector-56, HSIIDC, Industrial Estate,
Kundli, Sonipat, Haryana-131028

Website: http:www.niftem.ac.in

Email: pmfmecell@niftem.ac.in
Call: 0130-2281089