

Reading Manual for Petha

Under PMFME Scheme



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PETHA INDUSTRY IN AGRA

1. INTRODUCTION

For years, tourists visiting Agra have been buying a box of the trademark translucent petha. In fact, it's not uncommon to see people hopping off the train at Agra's railway station for a box, even if it's a five-minute halt. However, few of them know that the thriving cottage industry behind the petha once originated in the royal kitchens of the Mughal Empire. Petha is a soft, translucent candy made from winter melons (or ash gourd). Locals would also tell you that this is the purest form of sweets, just fruit, sugar syrup and water. Historical records show that some of the earliest instances of petha were found in the royal kitchens during the reign of Shah Jahan. The story goes that Emperor Shah Jahan once ordered his royal chefs to prepare a sweet that would be as pure and as white as the marble-clad Taj Mahal. The result was the petha.

Prepared by boiling and processing Ash Gourd (the vegetable "petha"), this sweet is the livelihood of thousands of workers in Agra. About 1500 cottage units produce 700-800 tons of Petha daily. Petha or patha candy is one of the popular eatable delicious. It is very popular in Mathura, Lucknow, Meerut, Agra and many other parts of U.P. Petha making is famous in Nuri Darwaja, Rawalpur, Hipitola, Johari Bazaar, Childi Bazaar, Kahalari, etc. of Agra.

History

The "delicacy" of Petha from Agra traces its history to almost four centuries back when it served thousands of employees engaged in the production of the great monument, Taj Mahal, as an instant supply of energy. Petha is a sweet, translucent candy made from winter melons (or ash gourd). Locals will also tell you this is the purest kind of sweets, only fruit, sugar syrup and water. Historical documents indicate that some of the early instances of Petha were found in royal kitchens during the reign of Shah Jahan.

Petha is as old as the Taj Mahal; legend has it that it was invented in the Mughal Empire when Taj Mahal was built. The 21,000 workers who constructed the memorial received the same meal daily that consists primarily of dal and roti. As Emperor Shah Jahan heard their request of change, he discussed this problem with

master architect Ustad Isa Effendi, and asked for the solution. Ustad Isa Effendi asked for help from Pir Naqshbandi Sahib. It is said that Pir learned this recipe from almighty itself and then taught his staff of 500 cooks the recipe of petha and then it was made a staple for workers.

2. PETHA FRUIT

Benincasahispida, the ash gourd, also called wax gourd is a vine grown for its very large fruit, eaten as a vegetable when mature. It is the only member of the genus *Benincasa*. The fruit is covered in a fuzzy coating of fine hairs when young. The immature melon has thick white flesh that tastes sweet. By maturity, the fruit loses its hairs and develops a waxy coating, giving rise to the name wax gourd. The wax coating helps to give the fruit a long shelf life. The melon may grow as large as 80 cm in length. It has yellow flowers and broad leaves. The taste is rather bland.

Ash gourd is one of the popular vegetables cultivated throughout India and extensively in the state of Kerala. Basically, Ash gourd is native to Java and Japan. Ash gourd is also called as “Winter Melon” or “Wax Gourd”. It is grown for its immature as well as mature fruits. Due to its medicinal properties, this vegetable/fruit is also used in ayurvedic medicinal preparations. The famous delicious Petha” is made out of this ash gourd. This crop is cultivated in south India for the vegetable purpose whereas in north India to make “Agra petha”.

Ash gourd (Fig 1) is also called *Winter melon (English)*, *Petha, Pethakaddu (Hindi)*, *Kohla (Marathi)*, *Neerpoosanikai (Tamil)*, *Kumbalanga (Malayalam)*, *BoodidaGummadikaaya (Telegu)*, *Budekumbalakayi, Boodugumbala (Kannada)*, *Kumra, Chalkumra (Bengali)*, and *Komora (Assamese)*.

Varieties of Ash Gourd (Petha Fruit)

PAG 3, PusaUjjwal, KashiUjwal, CO-1, CO-2, APAU Shakthi, MAH 1, IVAG.502, and MHAG 2 are the main varieties of Petha Fruit cultivated across India.

PAG 3: The fruits of this variety are attractive in appearance and medium in size. They are ready to harvest in 145 days and the average yield is 120 quintals /acre.

TNAU Ash Gourd Hybrid CO: It is a hybrid between PAG 3 and CO- 2. The plants are medium viny. The fruits obtained are oblong in shape and medium sized

(4-5kg) and are cultivated in duration of 120-130 days. This is a high yielding variety with an average yield of (91.82 tons/ha).

CO-1 (1971)

The fruits of this variety are large, oblong and/or oval in shape with an average weight of around 8-10kgs. The crop duration is of 140- 150 days. It has a yield potential of 20 - 25 tons/ha.

CO-2 (1982)

These are small, oblong in shape each weighing 2-4 kg in crop duration of 120-130 days. It has a yield potential of 34 tons/ha.



Fig 1: Image of Petha Fruit (Ash Gourd)

Cultivation of Ash Gourd

Climate Required for Growing Ash Gourds:

Basically this crop is a warm-season crop and thrives best @ temperature between 24°C to 31°C.

This crop also grows well in humid and heavy rainfall regions. Ash gourd crop is susceptible to frost conditions.

Soil Requirement for Ash Gourd Plantation:

This crop tolerates a wide range of soils. However, well-drained deep sandy loam soils with a pH range of 6.0 to 6.5 are best for its cultivation.

A higher yield can be expected in warm tropical climatic conditions with good soil organic matter.

Cultivation

Seed rate: 0.75kg-1kg/ha ;Spacing 4.5x 2m

Planting

Sowing can be started with the receipt of first few showers during May –June. Prepare the soil to a fine tilth by ploughing and harrowing. Pits of 60cm diameter and 30-45cm depth are taken at a spacing of 4.5x 2m . Well rotten FYM and fertilizers are mixed with top soil in the pit. Sow 4-5 seeds per pit at 1-2cm depth.

Avoid deeper sowing as it delays germination. A pre sowing irrigation 3-4 days before sowing is beneficial. The seeds germinate in 4-5 days.

Unhealthy plants can be removed after 2 weeks and retain 3 healthy plants per pit is better. To reduce the seed borne pathogens soak the seeds in 0.2% bavistin solution 2 hours prior to sowing is recommended.

Trailing

Ash gourd is grown trailing on the ground by spreading dried twigs and coconut leaves on the ground to prevent the fruits from coming in contact with hot soil.

Irrigation

During the initial stages of growth, irrigate the crop at 3-4 days interval, and in alternate days during flowering/fruiting. Furrow irrigation is the ideal method of irrigating.

But in areas where water is a limiting factor then drip irrigation can be resorted. During rainy season, adequate drainage is essential for the proper plant growth and survival.

WeedControl

Conduct weeding and raking of the soil at the time of fertilizer application. Earthing up is done during rainy season. Hand or hoe weeding can be done as needed

Manures and Fertilizers for Ash Gourd Crop:

Application of farmyard manure of 25 tonnes per hectare as the basal dose is required at the time of land/soil preparation. Fertilizers, 25 kg of P₂O₅ (full dose)/ha, 25 kg of K₂O (full dose)/ha and 1/2 dose of Nitrogen (35 kg) should be applied. The remaining of Nitrogen (35 kg) can be applied in 2 equal split doses at the time of vining stage and full bloom stage.

Pests and Diseases of Ash Gourds:

Leaf beetles, leaf caterpillars, and fruit fly are the major pests found in ash gourd farming.

The main diseases found in ash gourd farming are powdery mildew & downy mildew.

Note: The yield of ash gourd depends on many factors like soil type, variety, season, and other cultivation practices.

Main area of cultivation in India

It's extensively grown in state of Kerala, Tamil Nadu (Erode, Coimbatore, Villupuram), UP (Kanpur, Auraiyya) Punjab

2.4 Nutritional composition of Petha Fruit

Table 1 shows the average nutritional value of petha fruit.

Table 1: Nutritional Composition of Petha Fruit

Nutritional value per 100 g (3.5 oz) ⁺	
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%)

3. BENEFITS OF ASH GOURD FRUIT

- One among best food for the diabetic patients
- Low calorific value
- Intake of ash gourd regularly will help to reduce excess weight (obesity)
- Helps to keep body cool
- Reduces constipation problem
- Good detoxifying agent
- Controls high cholesterol
- Enhances memory power
- Act as a blood coagulant
- Good for cold relief
- Good for treating asthma
- Its seeds used in the treatment of intestinal worms
- Leaves are rubbed on the bruises to heal them.
- Ash gourd juice in empty stomach, good for ulcers.
- It helps in maintaining water balance, dieresis etc.
- It has anabolic activity helps to grow new tissues, balancing acidity and alkalinity problems in the stomach and intestine
- Regular eating of ash gourd will give good results for insomnia problem.
- It is used as brain food to treat mental illness and nervous disorders such as epilepsy.
- Seeds are having angiogenesis properties which stops the growth of tumors and progression of cancer by limiting the formation of new blood vessels.
- Ash from burning rind and seed when mixed with coconut oil when used promotes hair growth and reduce dandruff.

4. ASH GOURD MARKET

Ash gourd is collected in *mandior* vegetable wholesale markets by either farmers or distributors. The rate of Ash Gourd for petha production is mainly based on daily daily auction for the whole batch of Ash gourd, which ultimately decides the price of the day.

Generally during high production season (Summer) price can be as low as Rs. 270-310 per *mann* (40kg)

However due to pandemic, restriction in transportation has hiked up the prices upto Rs. 400-410 per *mann*(about Rs. 10.00 per Kg).

5. OTHER RAW MATERIALS

5.1. Sugar

Giving the characteristic hard coating and sweet taste to petha, sugar is the most important raw material after the Ash Gourd itself.

Three types of sugar are used viz: Refined mill sugar, Desi unrefined sugar and Khandsari sugar.

- **Refined Mill Sugar:** It's the most used sugar in the petha industry as the processing of petha requires clear sugar syrup and the least amount of impurities is in this type of sugar.

The storage of this type of sugar is the easiest as moisture content is very low (around 1.5%) so as long as dry and low RH (20-25%) condition is maintained it can be stored up to indefinite period of time.

Procurement of refined sugar by manufacturer is through wholesalers located in the neighborhood. In Agra, near NooriDarwaza area the price is ₹ 3100-3500 per quintal. Fig 2(a) shows the image of refined sugar that can be used in petha processing.



Fig 2(a): Refined sugar



Fig 2(b): Desi Unrefined sugar

- **Desi Unrefined Sugar:** Due to its low price, Desi sugar is used in low quality product. The amount of impurity is high when syrup is prepared and more cleaning is required to get the syrup ready for processing.

Due to higher molasses and impurity content the shelf life is also limited (3 months). The price varies according to the regions; in Agra the price is 2900-3100 per quintal. Fig 2(b) shows the image of Desi unrefined sugar that can be used in petha processing.

- **Khandsari sugar:** It was used in earlier days, but now due to availability of cheaper alternative (refined sugar) and ultimately less availability of *khandor* khandsari sugar, not much use is seen in the petha production. The amount of impurities is very high but the product formed is also of greater quality. The shelf-life is identical to unrefined sugar. The price now is ₹4000-4100 per quintal.

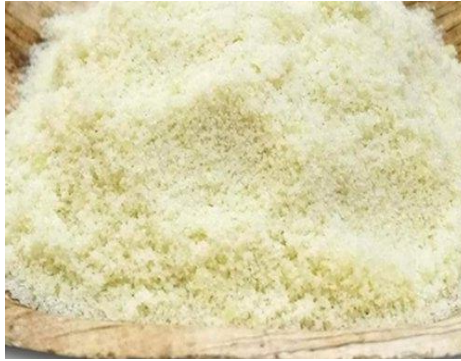


Fig 2(c): Khandsari Sugar

Lime or Choona

Calcium carbonate is a chemical compound. It is a common substance found in rock in all parts of the world, and is the main component of shells of marine organisms, snails, pearls, and eggshells. It is the active ingredient in agricultural lime, and is usually the principal cause of hard water.

In petha industry lime water is used for tightening or firming of processed ash gourd (Fig 3). Lime water as a waste is one of the major concern as it pollutes the environment. Lime water is prepared by soaking of lime (1-2kg) in 15-20 liter of water for 2-3 hours and then straining it to remove undissolved lime from solution (limewater). The times of washing and soaking duration of processed pieces of ash gourd depends upon type of petha being made and fruit age.



Fig 3: Lime used for preparation of limewater

Skimmed Milk

The process of cleaning of sugar syrup requires many additives the most important one is the skimmed milk. It's used to initiate the separation of impurities in the form of scum top layer which then can be removed using big slotted ladles. The protein in the skimmed milk binds with impurities in the boiling syrup and rise on top. The reason why skimmed milk is used as the fat in the milk will interfere in the binding process of the skimmed milk protein and will reduce flocculation.



Fig 4: Variety of Skimmed milk powder available in market

Sodium Hydrosulphite(*Rangkat*)

The main use of Sodium Hydrosulfite or Sodium Dithionite (locally called Hydro) is as a bleaching agent. It's used as a non-aggressive alternative to bleach and results in shinier, more 'white' petha. It's added in the syrup after the use of separator (Skimmed Milk).

Hydro is also used in cleaning of jaggery to get a more uniform product. This colourless or white crystalline powder is soluble in water. It is used in food industries due to its souring, buffering and chelating agents. Fig 5 shows a variety of hydro (Kalali hydro) that can be used in food industry for preparation of variety of foods. *Rangkat* or Hydro is used for making perfect jalebi that is crispy from outside and filled with syrup inside and one which does not get soggy.



Fig 5: Bleaching Agent

Alum (*Fitkari*)

It's an optional additive used mainly when preparing syrup from unrefined sugar, where it's used to remove dirt and extraneous matter (husk, twigs, sack binder etc.). This is also added at the end of the syrup making if needed.



Fig 6: Image of Alum (Fitkari)

Coloring and Flavoring Agents

Coloring agents are added to flavored petha to give them characteristic color corresponding to the flavor of the petha also increase the likeability to the customer. The color should be heat stable as the color is added in the boiling syrup to ensure coloring of whole petha piece till the core. Fig 7 shows the some varieties of synthetic colors like Kesari powder IH 9140, Apple green Powder IH 8925, Orange red powder IH 7802 used in petha industry.

Flavors either natural or synthetic are added in the flavored petha. These include Cardamom seed powder, Saffron, Gulkand are some natural flavors.



Fig 7: Different varieties of synthetic coloring agents used

6. WATER STANDARDS

There's extensive use of water in the process of ash gourd right from cleaning the dirt to use in the syrup (Part of the final product). So the water standards are also of utmost important when considering the quality of the product.

“The groundwater quality of the blocks BarauliAhir, FatehapurSikari, Saiyan, Achhnera, Shamsabad, Khandouli, Pinahat, Jaitpur Kalan and Bah falls under very good to medium category and can be used for the irrigation purpose.

However, the groundwater quality for the blocks Bichpuri, Akola, Fatehabad, Khairagarh, Etmadpur and Jagner falls under Medium to very bad category and hence cannot be used for the irrigation purpose.” (Kumar et al, 2017).



Fig 8: Water used for Lime Soaking

In Agra most of the manufacturer use groundwater for soaking of the pieces due to its natural hardness and then Nagar Nigam (Municipality) supplied water for syrup making and boiling of fruit pieces.

The parameters of groundwater of Agra were found to be - 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 (Ashfaq& Ahmad, 2014). These all limits are under the prescribed standard limits by CPCB (Central Pollution Control Board) and BIS. However magnification of specific parameter locally is possible, so treated water should be used for the processing of Ash Gourd.

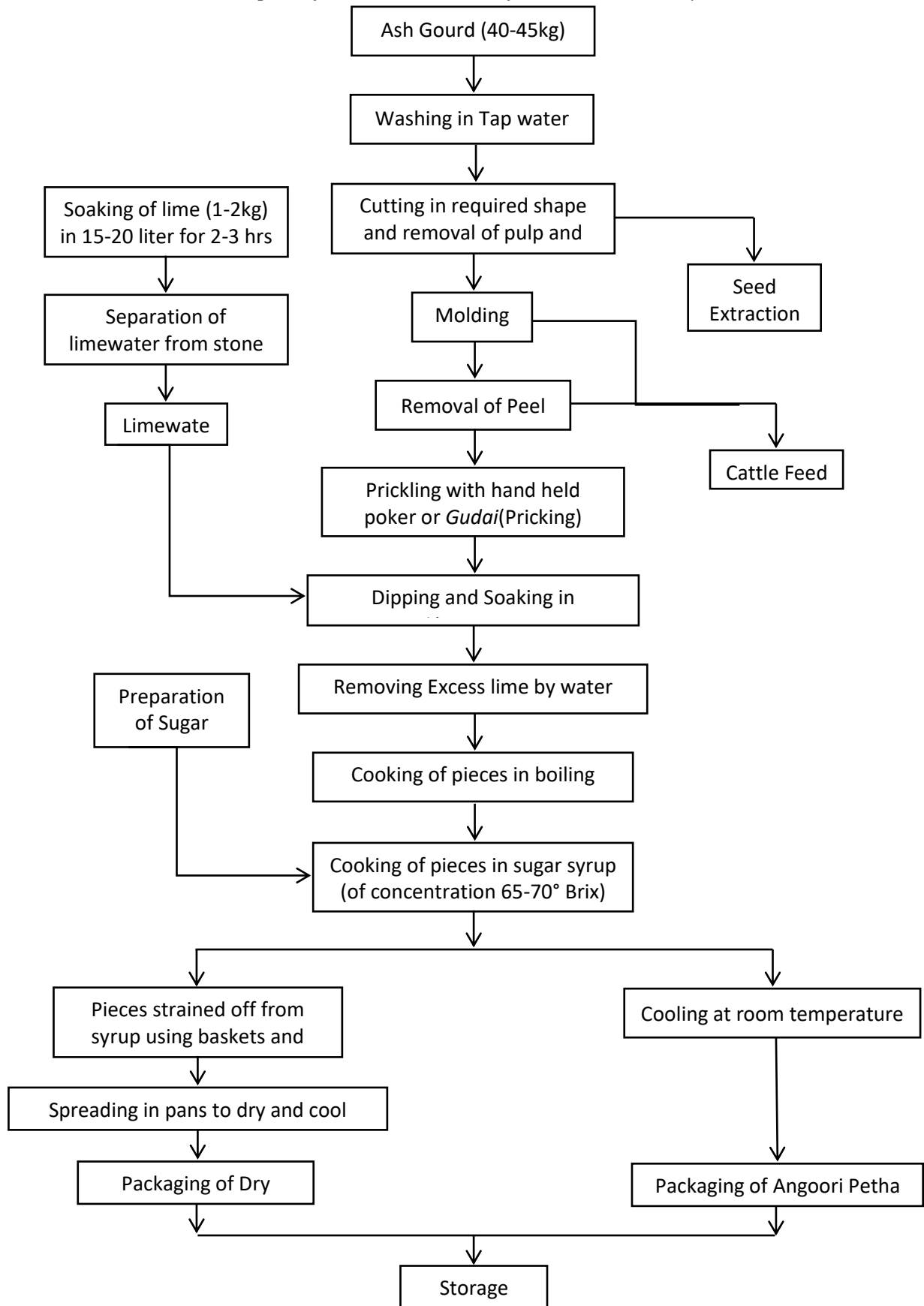
7. PROCESSING OF ASH GOURD INTO PETHA

The processing of ash gourd consists of the following steps:

- Preparation of Sugar syrup
- Sorting & Washing
- Cutting & Slicing
- Seed Extraction
- Soaking in lime water following by washing
- Addition of sugar syrup & boiling
- Addition of other ingredients (coloring agents etc.)
- Boling till sugar syrup of concentration 65-70° Brix
- Cooling
- Packaging and Storage

Fig 9: Process Flow Diagram of Angoori & Dry Petha

(As per information collected from Local Industry)



Preparation of Sugar Syrup

- Water is added to the cooking vessel with the sugar syrup remaining (if any) from the previous batch.
- Sugar, sifted to remove any dirt stones or twigs and added directly to the vessel.
- After dissolving under heat, the mixture is brought to a simmer and stirring is continued till no sugar crystal remains.
- Separator or skimmed milk is added to the vessel with constant stirring with large spotted ladles and the mixture is brought to a boil.
- After sometime white scum starts to collect on top. It's removed using ladle and collected in another small vessel (Fig 10).



Fig 10: Removal of scum

- When the scum starts to dilute to such extent that it passes through the holes in ladle, hydro (Sodium Hydrosulphite) and alum (if required) is added by properly dissolving it into water first.
- Addition of hydro and alum clears the syrup by formation of final thick scum layer over the solution which is skimmed-off using ladles.
- Solution boiling is now reduced to gentle simmer and sugar content of the syrup is adjusted.
- Water is added or evaporated (by boiling) to get the required 65-70° brix solution.
- If flavored petha is being made then artificial color and the flavors are added to the vessel and stirred to homogeneity.
- If plain petha is being prepared then the solution is transferred to another holding vessel lined with muslin cloth to remove any particulate.

PM FME – Processing of Petha

- If the scum in the collecting vessel collected has now separated into waste top layer and syrup below, the syrup collected at the bottom is also transferred to the holding vessel (Fig 11)
- Syrup is now stored till the boiling of ash gourd pieces is complete and to start further processing.



Fig 11: Transfer of sugar syrup to the holding vessel

Note: The organic solid waste and the emissions from coal combustion have been implicated in environmental problems in the Agra city and the adjoining stretch of river Yamuna. Although the use of coal was banned by the Supreme Court in 1996, it had not been implemented till very recently. Agra has also been declared as a part of the Taj Trapezium Zone (TTZ). Petha industry in TTZ has recently been ordered to either switch to gas-based technology or move their units, with the new proposed site being Petha Nagri in Kalindi Puram (Agra) from the existing Noori Darwaza area in Agra City. For both gas based and coal based heating, blowers were used to aid in high heating go the vessel. (Adjacent Figure)



Air Blower

- **Process Detail**

- Generally, a batch of 40kg (a mann) of raw ash gourd is processed at a time. Fig 12 shows a variety of raw ash gourd (unsorted) used for the further processing of petha.



Fig 12: Raw Ash Gourd fruits in storage

- Whole Ash gourds are washed with groundwater to remove any dirt or extraneous matter. During washing only, the spoiled or extremely damaged fruits are also discarded as compost or cattle feed. Fruits are rejected due to abrasion, holes by insects, over-ripened, or mechanically damaged (Fig 13)



Fig 13: Rejected Fruits

PM FME – Processing of Petha

- After washing, proper drying of surface is ensured so that during cutting process, the fruit may not slip in hands. Sun drying is the most preferable method of drying used for removing the surface water of ashgourd



Fig 14: Drying of Ash Gourd

- Cutting of the fruit is done by a long sharp blade knife. The shape of the slices depends upon which flavor of petha is to be prepared.
- Cutting into halves to check if it's spoiled from inside or not.
- The gloves are used for the protection against skin irritating components and for better grip.
- Cutting of Ash Gourd fruit has been depicted in Figure 15



Fig 15: Cutting of Ash Gourd

PM FME – Processing of Petha

- Pulp with seed is processed by a pulping machine (uses blunt blades to mash the pulp and separate the seeds from it, which settles down at the bottom due to gravity and then collected).
- Pulping Machine with stainless steel blades and opening at bottom for retrieval of seeds
- Seed extracted are now sun dried and sold as:
 - Either seeds for next crop,
 - Or as cashew substitute in gravies.



Fig16(a):Pulpwithseeds



Fig16(b)Extracted&DriedSeeds

- The slices are now cut into desired shapes using standard sharp edged
 - Into 4 longitudinal halves for dry *sadapetha* (plain)
 - Each longitudinal half into triangles for *panpetha*. The triangle blocks are sliced into thin triangular sheets using mandolin.
 - They are Slit longitudinally into two halves then sliced into appropriate thick latitudinal slices, which are then cut into circular or rectangular dies for *angoori*, *naariyal*, *santra-badamor chocolate petha* respectively.



17(a): Sliced Petha Fruit

- Now as the pieces have become small in size, they can be handled easily. They are then peeled so as to ensure that NO green residue remains on the piece as:

PM FME – Processing of Petha

- The green residue will impart vegetable off flavor to the final product.
- The outer green part consists of majority of toxins and harmful components.
- When boiled, the green part won't achieve the characteristic translucent appearance.



Fig 17 (b): Slicing into small pieces

- The extras remained after molding of the slices (if large) are then used in making of *Gulaab Lacchha petha*, where all these pieces can be grated to form strands (*Lacchha*). Further these strands are mixed with rose flavor and red color to get a value-added product after further processing.



Fig 18: Strands (Lacchha)

- Or if the pieces are too small to be grated then, along with the thick peels, are sold as cattle feed or used in composting to maintain the slightly acidic compost profile.



Fig 19: Peels collected for cattle feed

- Now the pieces are in desired shapes, for efficient boiling and for ensuring proper seepage of syrup, the pieces are pricked using hand held pokers or poking (*Gudai*) machines.
 - The dry petha pieces are cut down to final shapes after the process.
 - Small pieces like of *Cherry orangoori* petha are poked using hand held poker only.
 - *Paanor lachhapetha* pieces are not poked as they're already so thin that boiling is sufficient enough.



Fig 20: (a) Simple cutter(b) Pricking (Gudai) Machine

(c) Hand Held Poker

- Lime water soaking is done so as to firm the Ash gourd pieces as they are about to receive very high temperature treatment. The process is done in tanks filled with lime water, the process continues for 2-3 hours and for efficient action of firming agent, lime water is changed 3-4 times in the whole process.



Fig 21: Lime Water Treatment

- After firming process, the pieces are washed thoroughly with water to remove excess accumulated lime on the Ash gourd pieces.
- Now they're first boiled in water to:
 - Remove any vegetable odor from the pieces
 - Prepare the pieces (act as pre-treatment) for the final syrup boiling treatment
 - Clean the surface created pores for proper absorption of syrup in the next process.
- Syrup stored in holding vessel is poured into the cooking vessel along with strained and boiled Ash gourd pieces. The batch is boiled for proper seepage of syrup.
- Color and flavors are added into the syrup if flavored petha is being prepared.



Fig 22: Petha Pieces being cooked in sugar syrup with coloring agents

- Now processing of *Angoori* and *Sada* (Plain) petha follows different path till storage.

❖ For Dry Petha

- Pieces when cooked are strained off using spotted ladles and basket to remove excess of sugar syrup.



Fig 23: Removal of Excess Sugar Syrup

- Then these pieces are transferred to large trays where pieces are constantly being moved around with ladles so as to ensure that:
 - Most of the heat escapes from each surface of the petha.
 - If left undisturbed, then the bottoms will get soggy.
 - Also if not constantly moved in the tray then they might stick after cooling and transfer to package will get very difficult.
- After the syrup hardened on the outside, (indicated by noise made by petha pieces as if we are agitating tray full of pebbles) trays are transferred to cooling racks where the internal temperature of petha pieces will reach room temp gradually over a specific period of time that depends on shape and size of the petha being prepared. Fig 24 shows the cooling arrangement in which petha is place at wooden racks at the room temperature for cooling.



Fig 24: Cooling of Plain/Dry Petha

- After proper cooling in racks dry petha are packed in cardboard boxes lined with a polythene film at the bottom and on top for easy removal of individual petha pieces.



Fig 25: (a) Petha boxes

(b) Dry Petha

(c) Dry Kesar Petha

❖ For Wet (*Angoori*) Petha

- For Angoori petha, the pieces are transferred to a vessel and if the piece size is small (for Cherry, Kesari petha) it is transferred along with the syrup and gradually allowed to cool down to room temp.



Fig 26 : Cooling of (a) Cherry *Angoori* petha and (b) *Kesari* Petha to Room Temperature

- However, for large petha like orange angoori petha pieces and syrup is to be transferred into shallow trays (Fig 27) so that pieces don't get overcooked and efficient cooling can take place.



Fig 27: Orange angoori petha under preparation

- After the petha pieces have cooled down to room temperature they can be packed in polypropylene pouches with syrup (Fig 28) while ensuring that most of the air is removed from the pouch before sealing.
- These hermetically sealed pouches are packed into individual cardboard boxes to ensure that they do not get damaged during handling



Fig 28: Packaging of petha in polypropylene pouches

- Storage should be done in relatively low (20-25%) RH with proper ventilation (if stored at RT) also exposing to direct sunlight should be avoided. Refrigeration temp is taken (6 ± 1 °C)

Storage Type	<i>Angoori</i> (wet) Petha	Dry <i>Sada</i> Petha
Room Temperature	20-25 days	30-40 days
Refrigeration	30-35 days	45-50 days

- It should be noted that shelf life depends upon various factors such as sanitary condition, seasons (petha last longer in winters than summer) and package handling. So before consuming old petha one should always check for organoleptic traits of the petha.

8. EQUIPMENT USED

Cooking Vessel

It's a cast iron vessel normally call *Kadha* of hemispherical shape with very heavy bottom (to prevent burning of product and heavy bottom allows more retention of heat whilst cooking). The average volume of the vessel ranges from 50 liters to up to 150 liters of water.



Fig 29: Kadha: Open Pan or Vessel for cooking

Poker

Traditionally hand held poker were used but due to increase in demand poking machines are now used for the purpose. Still for small piece petha type hand held pokers are used.



Fig 30: Hand-held Poker

Shape cutters

For the desired shape of the type of petha and to get uniform size mold with sharp edges on one side are used. These are of different types such as triangular, circular cutter. Sharp knife with long blade is also used in petha cutting, trimming and peeling.



Fig 31: Petha Cutter

Heating Element

Traditionally coal was used to boil the petha but due to environmental concerns use of coal was banned and was replaced by LPG. LPG was cleaner, more efficient (dissipated more heat), required relatively less work input to produce same amount of heat as coal.

Blowers are used to provide oxygen below the vessel.



Fig 32: LPG Cylinders Setup to fire pit

Holding vessel

Holding vessels are large vessels which are used to store syrup and prepared petha (to cool off). These can be trays, metal silos etc.



Fig 33: Different types of vessels used for holding syrup and petha during preparation

Lime pit

The soaking of ash gourd pieces in lime water is done in lime pits which have a deposition of lime cake (created over-time) which prevents leaching in and out of components to and from soaking lime water liquid respectively.



Fig 34: Lime Pits

PETHA Packaging

1. For Dry Petha:

Corrugated / duplex box lined with High Density Polyethylene (HDPE). Lining can be either attached to the inner cardboard side or just a single film of HDPE is placed at the bottom of the box and then dry petha is packed. (Fig 35)

The box used for petha packaging is open top type box for ease in display.

Dimensions of the cardboard boxes (Length X Width X Height) (in cm) vary from (15x10x5) to (17.5x15x2.5). The thickness of cardboard used is 1-2 mm.



Fig 35: Corrugated Box Pack for Dry petha

2. For Wet, Angoori Petha

Corrugated / duplex box are used with hermetically sealed HDPE pouches of petha filled with sugar syrup (Fig 36). Cardboard box is used for the safety, easy stacking and handling of the product. Sealing is done by vacuum sealers in industries, however cottage industries also uses heat sealing machines also.





Fig 35: Packaging for Wet, Angoori Petha

3. For Special Petha

For petha like Chocolate Petha, PaanPetha, PVC/PET transparent boxes are used of 0.5-2 mm thickness. These are used for two main purposes namely for display of product and safety purpose.



“There is no specific packaging that is followed by the petha industry there’s deviation from manufacturer to manufacturer due to low shelf life of the product. But basics like Seal Packing wet petha, displayable packaging are same everywhere.”

~ Petha Manufacturer

Food Safety and FSSAI Regulations

The Food safety Standard Authority of India (FSSAI) has been Established under food safety and standard Act 2006, which consolidates various acts and orders that have hitherto handled food related issues in various ministries and departments.


FSSAI has been created for laying down science based standards for articles of food and regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

Every food business operator involved in the manufacturing, processing, storage distribution and sale of food products must compulsorily obtain FSSAI Registration or License.

It is a 14-digit registration or a license number which is printed on all the food packages. The 14 digit registration number gives details about the assembling state, producer's permit.

Obtaining a license can provide the food business with legal benefits, build goodwill, ensure food safety, create consumer awareness, and assist in business expansion. Also it helps regulate, manufacture, storage, distribution and sale of import food.

• FSSAI Registration and License



Central License	<ul style="list-style-type: none">• Large Food Business• For turnover more than 20 crore.
State License	<ul style="list-style-type: none">• Medium Food Business• For turnover between 12 lakh to 20 crore.
Basic Registration	<ul style="list-style-type: none">• Petty Food Business• For turnover less than 12 lakh

Procedure for Basic Registration

1. Application Filling (Form - A) Application Fee - 100/-
2. Processing of Application
3. Either grant or Reject Registration certificate, issue notice for inspection.
4. After inception Grant the Registration

Procedure for Central/State Licensing

STEP-1: Apply for the license

STEP-2: Unique Application Reference numbers.

STEP-3: Fill the Additional Information on Incomplete Application.

STEP-4: Unique Application ID Generate.

STEP-5: Inspection of Application and Issue of Inspection Report.

STEP-6: License Granted

Modification of FSSAI License

- Food Business Operator (FBOs) are required to report any changes in the business to Food Safety and Standards Authority of India (FSSAI) within a reasonable time.
- Any changes related to kind of business, scale of production, products category or formulation etc. should follow the regulations.
- Once the FSSAI License or registration (Form C) has been granted, any change required in the same requires filing application for the modification of FSSAI License or Registration.

Renewal of FSSAI License

The FSSAI license is essential to commence the food business, similarly it is imperative to renew the license. The license is issued for a validity of 1 year or 5 years, so the business must apply for renewal 30 days prior to the expiry of current license.

The FLRS(Food Licensing and Registration System) is utilized in five Regional Offices for the issue of licenses and entitlements. They are:

1. Northern Region - New Delhi
2. Eastern Region - Kolkata
3. North Eastern Region - Guwahati
4. Western Region - Mumbai and Kerala
5. Southern Region - Chennai

FOOD SAFETY AND STANDARDS (FOOD PRODUCTS STANDARDS AND FOOD ADDITIVES) REGULATIONS, 2011

- Food Standards for fruit and fruit products and nut and nut products;
Sugar boiled confectionery (2.7.1):

Sugar boiled confectionery whethersold as hard-boiled sugar or pan goods confectionery or toffee or milk toffee or modified toffee or Lacto-bonbon or by any other name shall mean a processed composite food article made from sugar with or without doctoring agents such as cream of tartar by process of boiling whether panned or not. It may contain the center filling, or otherwise, which may be in the form of liquid, semi-solid, or solids with or without a coating of sugar or chocolate or both.

It shall also conform to the following standards, namely:

- Ash sulphated (on salt free basis) Not more than 2.5 per cent by weight.
- Provided that in case of sugar boiled confectionery where spices are used as Centre filling, the ash sulphated shall not be more than 3 per cent by weight.
- Ash insoluble (in dilute Hydrochloric acid) not more than 0.2 Per cent by weight.
- Provided that in case of sugar boiled confectionery where spices are used as center filling, the ash insoluble in dilute Hydrochloric acid shall not be more than 0.4 per cent.

List of Food Additives/Preservatives and color for use in food

S. No.	Name of Additive/Preservative	Limit in Sugar based/ Sugar free confectionary
1	Gellan Gum	2% max (in sugar boiled confectionery only)
2	Benzoic Acid, sodium & potassium benzoate	1500ppm max
3	Sulphur dioxide	2000ppm max
4	Sorbic acid and its calcium	2000ppm max
5	Class I preservatives as listed under regulation 3.1.4	GMP
6	Chlorophyll	GMP

PM FME – Processing of Petha

Good Manufacturing Practices (GMPs), Sanitary and Hygienic Requirements for Petha Processing

- The premises shall be located in a sanitary place and free from filthy surroundings and shall maintain overall hygienic environment. All new units shall set up away from environmentally polluted areas.
- The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage to maintain overall hygienic environment.
- The premises shall be clean, adequately lighted and ventilated and sufficient free space for movement.
- The floor and skirted walls shall be washed as per requirement with an effective disinfectant the premises shall be kept free from all insects.
- No spraying shall be done during the conduct of business, but instead fly swats/ flaps should be used to kill spray flies getting into the premises.
- The water used in the manufacturing shall be potable and if required chemical and bacteriological examination of the water shall be done at regular intervals at any recognized laboratory.
- Continuous supply of potable water shall be ensured in the premises. In case of intermittent water supply, adequate storage arrangement for water used in food or washing shall be made.
- There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.
- The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.
- Persons suffering from infectious diseases shall not be permitted to work. Any cuts or wounds shall remain covered at all time and the person should not be allowed to come in direct contact with food.
- Eating, chewing, smoking, spitting and nose blowing shall be prohibited within the premises especially while handling food.
- Insecticides / disinfectants shall be kept and stored separately and away from food manufacturing / storing/handling areas.
- Proper gloves should be used when handling raw petha, to avoid skin rashes.

- WASTE Management of Petha Industry.

- As cattle feed.

The main utilization of petha peel and core is as cattle feed for cows and buffalo mainly. These waste products provide cattle with some basic micronutrients which are necessary for healthy growth.

- In organic manure.

Petha peels and core can also be used as major component of compost as it can help in reducing the pH of the soil and help to maintain the acidic profile of soil necessary for composting.

9. PROBLEMS BEING FACED BY PETHA INDUSTRY:

(As per feedbacks received from the Petha Industry owners & Petha Producer Union Officials at Agra)

- **No subsidy on LPG by Government ,thereby resulting in increased cost of production**
(as given to bangle manufacturers of Firozabad in UP)
- **High water bill for the potable Municipality supplied water.**
- **No interest in proper certification by petha manufacturing community**
- **No efficient waste utilization for petha till now** (approx. 75% waste from one fruit)
- **Lack of proper Packaging**
- **Limited shelf life of product thus restricting its exports**