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Mango Puree Production

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MANGO PUREE PRODUCTION

Mango puree is produced from the highest quality fruits. It is prepared by processing the fruit which has been cleaned, sorted and inspected. The pulp is then extracted, pasteurized, sealed and processed in accordance with good manufacturing practices. Mango puree is used in juice and other kinds of beverage preparation. It can also be used as flavoring ingredients in preparing ice creams, yoghurt among others.

Product Description

Mango puree is the extract obtained from mango pulp and does not contain added water, sugar or any other ingredient. This means that it is 100% mango.

Description of Procedure and Quality Control Points in the Processing of Mango Puree

1. **Raw Material Selection**
   - 1.1 **Mango**
     - a. *As purchased*
       - variety – carabao
       - appearance – absence of physical/ mechanical damage affecting the flesh
       - degree of ripeness – table ripe, mature
       - size and shape – full cheek; 200g/piece minimum, examine depressed end
       - clean – free from dirt and soil particles
     - b. *For processing*
       - appearance
         - yellow peel and bright yellow orange pulp
         - absence of physico-mechanical damage affecting the flesh
       - degree of ripeness
         - table ripe stage
         - fully yellow and firm
       - physico-chemical properties
         - pH 3.9–4.58
         - %TA 0.3%, minimum
         - TSS 15^{o}Brix minimum
         - Weight: 200–350 g/piece
   - 1.2 **Can material**
     - a. *Type* – epoxyphenolic lacquered for both body and ends
     - b. *Size* – epoxyphenolic lacquered for both body and ends
     - c. *Can quality* – epoxyphenolic lacquered for both body and ends
2. **Washing and chlorination**

   The ripe mangoes are washed for removal of extraneous matter, then soaked in 100 ppm chlorine solution for 10 minutes. Handlers should wear clean uniforms, head caps and hand gloves.

3. **Cutting and scooping**

   The two cheek halves are cut from the seeds. The flesh from the cheeks is scooped out with the aid of stainless steel scooping spoons. The seed portions are also peeled and prepared for puree production.

   This step should be done fast and in strictly clean environment to avoid a high initial load from contamination due to handling.

4. **Pulping/Finishing**

   The pulp from the cheeks and seeds is passed through the pulper/finisher from which the puree is collected. If the puree is coarse, repeat passing through the pulper again. Weigh the puree to compute for the yield. Determine TSS, %TA and pH. Machine should be thoroughly washed after each batch of production of mango puree then washed with 200 ppm chlorinated water.

5. **Heating/Pasteurizing**

   Transfer the puree to the steam-jacketed kettle and heat to 82^{o}C with continuous stirring. Watch for scorching especially on the sides of the kettle. Make sure 82^{o}C is reached throughout the processing of the whole batch by mixing or agitating.

6. **Filling/Sealing**

   Fill in weight and proper headspace must be observed. Headspace must be ¼-inch for cans and 1/3-inch for jars.

   Filling into cans may be done with a filling machine or manually with a ladle. In the absence of an exhaust line, the cans should be sealed immediately so as not to allow a significant drop in temperature which would affect the initial product temperature.

The sealing temperature also has an effect on the residual oxygen in the can. Before the can is sealed, air must be removed from the contents. Normally, this is carried out by passing the cans through a steam box until the temperature at the center of the can is at least 82^{o}C. This operation, termed exhausting is an important consideration for the following objectives:

1. To minimize strain in the seams due to expansion of air and can contents during processing;
2. To remove oxygen which accelerates internal corrosion in the can and also causes oxidation of the food with possible serious effects on color (oxidation browning), flavor and nutritive value (loss of ascorbic acid);
3. To enable vacuum to be formed when the can is cooled. This ensures that the lids remain concave, even when storage temperatures are a little higher than usual, and also to act as a reservoir for hydrogen which may be formed by reaction between can and contents. Thus, a high vacuum favors a long shelf life. The recommended vacuum for some foods is 10–20 inches (Lopez, 1981).

Correct weight (220 g/can) of puree must be filled into the cans. Underfilled cans will be underweight which is illegal and the headspace will be too large, resulting in too much air being left in the can. Overfilling, can result in understerilization and may cause bulging of cans. This is so, since food expands when heated and overfilling can cause permanent bulging to cans during retorting. On the other hand, the absence of vacuum in such cases may also result in flipping or distortion (bulged cans).

7. **Processing**

After seaming, the cans are heated for a definite time and temperature to kill or inhibit organisms which may cause spoilage. This is the crux of the whole canning procedure.

The time-temperature combination required of a particular product e.g. mango puree with pH above 4.0 have been scientifically determined to attain commercial sterility. For mango purees with pH above 4.0, the process required for 211 x 300 can size is 33 minutes at 100°C, based on the destruction of a spore-forming bacillus. For pH below 4.0, the process schedule of 18 minutes at 100°C for 211 x 300 can size is required to destroy the most heat resistant spoilage-causing organism, *Byssochlamys fulva*.

There should be rapid handling and prompt retorting of filled cans. A long holding period between filling and sealing or between sealing and retorting cans may result in souring, off-flavor and loss of vacuum. If longer times are required to obtain enough cans to fill a retort, processing of partial retort loads should be practiced.

8. **Cooling**

As soon as the processing time is completed, the cans are cooled in water as rapidly as possible without damaging them. Rapid cooling is necessary in order to eliminate the possibility of thermophilic spoilage. Thermophiles multiply rapidly in the range of 49–71°C and failure to cool cans immediately after heat processing to a temperature below 49°C may lead to serious spoilage.

For mango puree which is processed at 100°C or at atmospheric pressure, not much difficulty is encountered during cooling than when processing at high pressure, e.g. 121°C.

If a cooling water bath is used, the processed cans are immediately taken out of the retort and plunged into the water. Water used in cooling must be potable i.e., it must not contain bacteria capable of causing human intestinal diseases, and is authentically satisfactory for drinking purposes, which means it is free of undesirable odors and flavors (Lopez, 1981). During processing the seams are slightly expanded and the lining compound in the seam is softened, so that it is possible for a minute droplet of water has a heavy bacterial load, spoilage organisms may enter the can.

The water used for cooling cans must be within the standard for drinking water i.e., it must be potable. Chlorination at 1–3 ppm is recommended to ensure this.

Cooling the cans to 38°C will allow the remaining heat to dry the cans. The cans are then stacked so that they will air cool rapidly. It is suggested that the cans be stacked on their sides in single rows, allowing space for air circulation between the rows.

9. **Labeling**

Check for can condition (dents, paneling, etc.) before labeling. Observe proper labeling and make sure all the information needed are indicated on the label.

10. **Storing**

The cans should be stored under cool and dry conditions (25–30°C). The maintenance of a constant temperature of storage is desirable since a rise in temperature may lead to condensation of moisture on the can with eventual rusting. Cool conditions are required because storage at higher temperatures not only causes chemical and physical changes in the product and the container but also introduces a risk of spoilage due to thermophilic bacteria.

PROCESSING PROCEDURE

Raw Materials

rare ripe (carabao var.)

Equipment/Utensils

stainless-steel knife
double broiler
stove
dial thermometer

Packaging Material

8 oz. sterilized jars/bottles with new caps

Procedure

1. Wash mangoes to remove surface dirt.
2. Slice along its lateral axis from both sides of the middle seed section, scoop out mango flesh and peel seeds.
3. Grind mango flesh in a blender.
4. Heat the pureed mango until it simmers (80^{o}C) using double broiler.
5. Hot fill puree in sterilized glass bottles or cans and seal.
6. Process or sterilize filled containers in boiling water (100^{o}C or 212^{o}F) for 30 minutes.
7. Air cool and store in cool, dry place.

GLOSSARY OF TERMS

Brix (Soluble Solids) – technically defined as percent sucrose as measured by a Brix hydrometer. It is common practice in the canning industry to determine Brix by means of the sugar scale on a refractometer. Although this is not exactly equivalent to Brix, the two values agree very closely and for practical purposes are equivalent.

Commercial Sterility – the condition in which all *Clostridium botulinum* spores and all other pathogenic bacteria have been destroyed as well as more heat resistant organisms, which if present, could cause product spoilage under normal conditions of storage and distribution.

Headspace – the gross headspace is the vertical distance from the top of the double seam of a can to the level of the product (generally, the liquid surface) in the container. The net headspace of a container having a double seam, such as a can, is the distance from the liquid level to the inside surface of the lid. This may be approximated by subtracting from the gross headspace 3/16 of an inch, which is the average height of the double seam.

pH – a value denoting the degree of acidity or alkalinity on a scale from 0–14. pH 7 is the neutral point (pure water). Decreasing values below 7 indicate increasing acidity, increasing values above 7 indicate increasing alkalinity. Most meat and fish products have a pH-value of 6-7, vegetables 5-7, and fruits 3-5.

Process – as applied to food canning means the application of heat to hermetically sealed containers for a definite time and at a definite temperature under specific conditions.

Shelf-life – the length of time that the product or the can will maintain market acceptability under specified conditions of storage, e.g. temperature.

Vacuum – refers to the difference between the pressure inside and the pressure outside the container. It is ordinarily measured with a Bourdon tube type gauge which reads in inches (equivalent to inches of mercury in mercury column). The term vacuum as used in the canned food industry is an indication of the amount of air left in the headspace of food cans.