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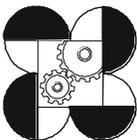
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PINEAPPLE PROCESSING



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‘Our Business is Industry...’

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PINEAPPLE PROCESSING

INTRODUCTION

Canning is a well-developed industry. Traditional canned pineapple products are: juices, slices, chunks, tidbits, diced, spears, crushed and concentrate. Other pineapple products include: sugar preserves (jams, jellies, marmalades, dried/glazed), frozen and several by-products like wine, vinegar and *nata de piña*.

Aside from low sugar and sulfite free dried pineapple and pineapple juice powder, ITDI has also developed new pineapple products. These are vacuum fried pineapple chips, pineapple flakes and freeze-dried pineapple.

DEHYDRATED PINEAPPLE

Product Description

Dehydrated pineapple is prepared from mature smooth cayenne pineapple syruped in three stages of concentration and dried using a cabinet drier. The product has a bright yellow color, plump appearance, chewable and juicy texture with a strong pineapple flavor and aroma.

Procedure

1. Weigh rareripe pineapple. Remove crown. Weigh. Wash pineapple thoroughly in tap water.
2. Soak in chlorinated water (200 ppm)* for 10 minutes to reduce microbial load. Drain.
3. Peel the fruits and remove the eyes and the core.

4. Cut the fruits into wedges of about ½- to 1-inch thickness or dice it into desired size and thickness.
5. Steam-blanch the fruit slices for 8 minutes. Cool rapidly in running water.
6. Soak the fruits into hot boiled syrup (60 parts sugar, 40 parts water). Cook it rapidly until translucent. Cool to room temperature.
7. Add 0.1% sodium metabisulfite (or a combination of 0.1% sodium erythorbate and 0.1% citric acid). Soak overnight in syrup for 18-20 hours.
8. Drain the syrup. Rinse the fruit slices 2 to 3 times in tap water.
9. Drain thoroughly.
10. Lay the fruits in trays lined with cheesecloth. Dry in cabinet drier with $60\pm 2^{\circ}\text{C}$ temperature for 8 to 10 hours or until dry.
11. Remove the dried pineapples from the tray. Pack in ordinary plastic bags. Allow the dried pineapple to sweat overnight.
12. Separate pineapple slices. Pack it in a suitable packaging material.
13. Seal. Label and store in a cool dry place.

* *please see Annex A*

CANDIED PINEAPPLE

Procedure

1. Weigh rareripe pineapple. Remove the crown. Wash pineapple thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the fruits and remove the eyes and the core.

4. Cut the fruits into desired size and shape (or cut it into wedges of about 2 cm thickness or dice it into desired length and thickness).
5. Soak the cut fruits into hot boiled heavy syrup (1 part water: 1 part sugar) containing citric acid equivalent to 0.3% (3g/liter of syrup), and sodium benzoate, 0.1% (1g/liter of syrup). The latter is added as a precautionary measure against mold growth.
6. Let the mixture stand overnight in a cool place.
7. Drain off the heavy syrup from the fruits.
8. Increase the concentration of the syrup by 2% or more and boil.
9. Cool the hot syrup slightly and re-soak the fruits.
10. Repeat this operation daily for about a week or until the sugar no longer dissolves.
11. Drain the syrup-impregnated fruit.
12. Wipe off sticky syrup with clean moist cloth, and dry under the sun or appropriate drier until moisture content is about 30 to 35%.
13. Cool.
14. Pack and seal it in polyethylene bags, glass jars, or other appropriate containers.

MINIMALLY PROCESSED REFRIGERATED PINEAPPLE

Procedure

1. Weigh rareripe pineapple. Remove crown. Wash pineapple thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the sound rareripe fruits and remove the eyes and the core.

4. Wash it thoroughly using cold water.
5. Prepare syrup (2 parts sugar: 1 part water). Boil. Cool to room temperature.
6. Soak sliced pineapple in syrup for 10 minutes. Drain thoroughly.
7. Pack pineapples in plastic bags or in styropore.
8. Seal the package thoroughly. If using styropore, seal or wrap using PVC or saran wrapper.
9. Refrigerate at 2° to 3°C. The product will last for about a week at this condition.

PINEAPPLE IN SYRUP

Procedure

1. Weigh rareripe pineapple. Remove the crown. Wash pineapple thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the fruit and remove the eyes and the core.
4. Slice, dice, crush or cut the pineapple into desired size and shape.
5. Pack in clean tin cans or glass jars.
6. Prepare hot syrup (1 part sugar in 1 part water).
7. Pour hot syrup in containers containing pineapple slices.
8. Cover it with enough of the hot heavy syrup.
9. Exhaust to remove bubbles at 80°C for 10 minutes. Seal the containers tightly.
10. Process it in boiling water for 30 to 45 minutes depending upon the size of the container.
11. Let the canned product cool.
12. Wipe the containers to dry.
13. Label and store.

PINEAPPLE JUICE

Procedure

1. Weigh rareripe pineapple. Wash it thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the rareripe fruits and remove the eyes.
4. Wash and mash the fruit thoroughly.
5. Strain the juice through cheesecloth or in a muslin bag to remove the pulp.
6. To the juice, add sodium benzoate and citric acid equivalent to 0.05% (0.5 g/liter) and 0.3% (3 g/liter), respectively, of the total volume of the juice. Add sugar if desired.
7. Heat the juice rapidly with constant stirring to 80°C and maintain at this temperature for about 5 minutes.
8. Pour the juice while it is hot in tin containers or glass jars and seal immediately.
9. Process in boiling water bath for 15 minutes.
10. Let the canned product cool.
11. Wipe-dry, label, and store.

PINEAPPLE MARMALADE

Procedure

1. Weigh rareripe pineapple. Wash it thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the fruits and remove the eyes.
4. Wash it thoroughly.

5. Slice/Chop the fruit finely.
6. Add sugar and previously boiled thin slices of *calamansi* rind (5 parts fruit: 5 parts sugar: 1 part *calamansi* rind).
7. Add *calamansi* juice as desired. Mix well and cook it until the jelling point is reached which is determined by the sheeting or flake test. In this test, the marmalade is allowed to drop from the edge of the wooden spoon. The drops run together forming sheets or flakes, which break off in a clean harp manner.
8. When done, pack the marmalade in clean glass jars and seal tightly.
9. Process it over boiling water for 15 minutes.
10. Cool, wipe dry, label, and store.

PINEAPPLE JAM

Procedure

1. Weigh rareripe pineapple. Wash it thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the fruits and remove the eyes.
4. Wash and chop finely or mash the whole fruit.
5. Weigh the fruit and mix well with refined sugar (1 part fruit: $\frac{3}{4}$ to 1 part sugar). If the mixture is too sweet, add *calamansi* juice as desired.
6. Cook gently with constant stirring until thick and of the right consistency.
7. Pack the mixture while it is hot in clean glass jars and seal tightly.
8. Process in boiling water bath for 15 minutes.
9. Cool, wipe dry, label, and store.

PINEAPPLE JELLY

Ingredients

- 1 cup pineapple juice
- $\frac{3}{4}$ cup refined sugar
- 1 % pectin, optional

Procedure

1. Weigh rareripe pineapple. Wash it thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the rareripe fruits and remove the eyes.
4. Wash and mash the fruit thoroughly.
5. Strain the juice through cheesecloth or in a muslin bag to remove the pulp.
6. Add sugar to the juice. Dissolve sugar fully (1:0.75). Strain to remove impurities. If necessary, add pectin. Blend fully to dissolve.
7. Cook until the temperature reaches 107° to 109°C or until a soft ball is formed when the jelly is dropped in a cup of water.
8. Pour in sterilized dry glass jar.
9. Seal, label and store in a cool dry place.

PINEAPPLE VINEGAR

Ingredients

- 3 cups mashed pineapple (ripe/over-ripe, cores, fillings and trimmings)
- 9 cups water
- 2 cups refined sugar

- ½ tsp yeast
- 2 cups mother vinegar

Procedure

1. Prepare diluted fruit juice (one part mashed fruit to three parts water). Chop the fruit cores. Use a blender if available. Add water and put in a cheesecloth. Press to squeeze the juice.
2. Strain juice through a cheesecloth, if necessary.
3. Add sugar to the strained juice.
4. Place in a casserole and pasteurize at 65°C for 20 minutes (near boiling).
5. Cool and transfer in clean bottles.
6. Add yeast and cover the bottles with a clean cheese cloth or paper. Tie with a rubber band. (**Alcohol fermentation**)
7. Allow to ferment for 4 to 7 days or until no more bubbles or carbon dioxide are formed.
8. Strain through a cheesecloth.
9. Pasteurize again at 65°C for 20 minutes.
10. Cool the alcohol.
11. Add mother vinegar or starter to the alcoholic solution. (**Acetic acid fermentation**)

Note: *On the 14th day after the addition of the starter, the whole solution becomes mother vinegar to be used for the succeeding preparations.*

12. Set aside undisturbed for 1 month or until maximum acidity is obtained (3-4% acidity).
13. Filter the vinegar.
14. Pasteurize again at 65°C for 20 minutes.

15. Cool the vinegar.
16. Fill into clean sterilized bottles.

****** *To come up with a clear vinegar, add well beaten egg white (2 for every forty cups or 10 liters of vinegar) and heat it until coagulation of egg white takes place. The clear vinegar is obtained by filtration.*

PINEAPPLE PUREE

Procedure

1. Weigh rareripe pineapple. Remove crown. Wash pineapple thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the fruits and remove the eyes.
4. Wash it thoroughly.
5. Cut/Slice the fruit. Remove the core.
6. Grind or comminute the fruit using Waring blender or pulper finisher.
7. Pasteurize at 80°C for 10 to 20 minutes.
8. Pack in plastic bags or retortable pouches.
9. Seal immediately. Label and freeze at -25°C.

NATA DE PIÑA

Ingredients

| | |
|-----------|---------------------|
| pineapple | glacial acetic acid |
| sugar | starter |

Procedure

1. Mash 1 kg peeled pineapple with 12 liters water.

2. Add 600 grams sugar.
3. Boil.
4. Strain in cheesecloth.
5. Cool.
6. Add 340 mL glacial acetic acid.
7. Add 2 liters starter or mother liquor.
8. Mix in one container.
9. Transfer into sterilized wide-mouth container.
10. Cover with clean paper or cheesecloth and tie around.
11. Store in an area where it is not disturbed.
12. Ferment/let it grow for 10 to 14 days.
13. De-acetify by washing in several changes of water.

Product

1. Slice/dice *nata*.
2. Bleach under the sun with water.
3. Change water every 4 hours or boil in several changes of water.

PINEAPPLE WINE

Procedure

1. Wash and peel sound mature fruits. Waste core and trimmings from pineapple canning operation can be utilized for wine making.
2. Crush the peeled fruit and press well to extract the juice and strain through a cheesecloth or strainer.
3. To one part of the juice, add two to three parts of water. For every four (4) cups of diluted juice, add one cup sugar.
4. Mix well to dissolve the sugar and heat for 30 minutes to pasteurize. Cool. Add one (1) teaspoon yeast for every 18 cups of the juice mixture.

5. Pour the mixture into a demijohn or any suitable container. Loosely stopper the mouth of the container with cotton and store in a safe place.
6. Let it ferment for two (2) or more weeks until there is no more liberation of bubbles.
7. After fermentation, pasteurize then decant the clear liquid into any suitable container and age 2 to 3 months or more.
8. To the aged wine, add well beaten egg white (1 for every 12 cups) and heat in a steam bath to a temperature of 55°C or 60°C to clarify or remove the turbidity of the wine. Stir and maintain the temperature for 15 to 20 minutes then cool.

NOTE: The above procedure can be applied in making wine from other fruits such as cashew, *duhat*, *bignay*, melon, *siniguelas*, etc.

PINEAPPLE FRUIT BAR

Ingredients

- | | |
|--------|----------------------------------|
| 1 cup | dried pineapple |
| 1 cup | toasted rice crispies (optional) |
| 1 cup | roasted/toasted <i>pili</i> nut |
| 2 tbsp | glucose syrup |

Packaging Material

metalized foil laminates

Procedure

1. Cut dried pineapple into small sizes. Add roasted *pili* nuts. Mix thoroughly then add glucose syrup. Mix and pour in a mold.
2. Press thoroughly. Pack in appropriate packaging materials.

PINEAPPLE-MANGO LEATHER

Product Description

Pineapple-Mango leather, sometimes called fruit roll or fruit toffee, is prepared from the puree of table-ripe pineapple and mango, dried to form glossy sheets and cut into desired sizes.

The product is about 1 mm thick, deep yellow orange in color with the characteristic pineapple and mango flavors. The product is chewable. Its texture is pliable but can still be torn into pieces.

Pineapple-Mango leather can be eaten as is, as a snack or dessert, or used as pie fillings and toppings for cakes. The product remains of good eating quality for years when stored in the freezer, for months under refrigeration, and for about 7 months at ambient conditions.

Procedure

1. Weigh, sort and grade pineapple and mango.
2. Remove pineapple crowns.
3. Weigh.
4. Wash and rinse in tap water to remove adhering surface dirt.
5. Soak in 200 ppm calcium hypochlorite solution* for 10 minutes to reduce microbial load. Drain.
6. Peel fruits, remove middle core of pineapple.
7. Cut pineapple into size; slice and scoop out mango.
8. Comminute fruit slices using a Waring blender (1 part mango:1 part pineapple).
9. Adjust the initial soluble solids content to 20°Brix* with refined sugar. Use the Pearson's Square method to compute for the required amount of sugar.
10. Pasteurize mixture at 80°C for 20 minutes.
11. Spread puree evenly on greased stainless steel trays.

12. Dry in cabinet driers at $60 \pm 5^{\circ}\text{C}$.
13. Remove pineapple/mango leather from tray. Allow to sweat overnight.
14. Coat with 10% confectioner's sugar.
15. Cut into desired shapes and sizes.
16. Pack in laminates of paper/foil/polyethylene. Seal.
17. Pack in carton boxes, seal/tape and store in a cool, dry storage room.

PINEAPPLE PRESERVE

Procedure

1. Weigh rareripe pineapple. Remove the crown. Wash pineapple thoroughly in tap water.
2. Soak in chlorinated water (200 ppm) for 10 minutes to reduce microbial load. Drain.
3. Peel the fruits and remove the eyes.
4. Wash it very well.
5. Cut large fruits into desired thickness and shape. Leave the small fruits whole.
6. Drop the fruits into boiling syrup (2 parts water: 1 part sugar). Cook it rapidly until translucent.
7. Rapid cooking will result in a sparkling product while slow cooking, a dull and discolored product.
8. Pack the mixture while it is hot in clean glass jars and seal tightly.
9. Process in boiling water bath for 15 minutes.
10. Cool, wipe dry, label, and store.

ANNEX A

HOW TO PREPARE

I. *Calcium Hypochlorite Stock Solution (CHLORINATED WATER)*

- A. Concentration of desired solution: 10,000 ppm stock solution = C_2
Volume of desired solution: 1 gallon (3.78 liters) = V_2
Percentage available chlorine in hypochlorite granules: 70% = C_1

Calculation:

$$C_1 V_1 = C_2 V_2$$

where:

V_1 = volume of desired concentration

V_2 = required amount needed for final concentration

C_1 = percentage available in solution/granules

C_2 = concentration of desired solution

$$C_1 = \frac{C_2 V_2}{V_1}$$

$$V_1 = \frac{C_2 V_2}{C_1}$$

$$C_2 = \frac{C_1 V_1}{V_2}$$

$$V_2 = \frac{C_1 V_1}{C_2}$$

Problem:

Prepare one gallon stock solution with 10,000 ppm concentration using calcium hypochlorite (CaOCl_2) granules with 70% available chlorine.

Required:

Amount of calcium hypochlorite granules needed to prepare 10,000 ppm concentration of stock solution.

Solution:

Volume of stock solution = 1 gal (3.78L; density_{water} = 1 kg/L; therefore 3.78 kg)

Weight of stock solution = 3.78 kg

$$C_1 = \frac{C_2 V_2}{V_1}$$

$$C_1 = \frac{(3.78 \text{ kg}) (1\%)}{70\%} = 0.054 \text{ kg or } 54 \text{ g}$$

Preparation:

Dissolve 54 g calcium hypochlorite granules in 1 gallon water. Mix.

- B. Prepare a gallon chlorinated water with concentration of 30 ppm needed to sanitize food handlers hand. How much stock solution with concentration of 10,000 ppm is required to make the desired chlorinated water for sanitizing food handler's hand?**

Given:

Let $V_2 =$ Volume of desired chlorinated water = 3.78 L

$C_2 =$ Concentration of desired chlorinated water = 30 ppm

$C_1 =$ Concentration of stock solution = 10,000 ppm

Required:

$V_1 =$ Volume of stock solution needed to prepare a gallon of chlorinated water with concentration of 30 ppm

Solution:

$$V_1 C_1 = V_2 C_2$$

$$V_1 = \frac{V_2 C_2}{C_1} = \frac{(3.78 \text{ L}) (30 \text{ ppm})}{10,000 \text{ ppm}}$$

$$V_1 = 0.01134 \text{ L or } 11.34 \text{ mL}$$

Preparation:

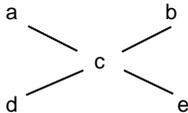
Add 11.34 mL of stock solution from A to 1 gallon water. Mix.

To 11.34 mL of stock solution from A, add enough water to make 1 gallon. Mix thoroughly.

- C. Prepare a gallon of chlorinated water with concentration of 200 ppm.

COMPUTATION - SAME AS B.

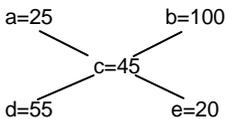
II. Amount of sugar using the Pearson's Square Method



where:

- a : initial soluble reading
- b : purity of sugar
- c : desired soluble solid concentration
- d : difference between purity and desired
- e : difference between desired and initial
- f : quotient between e and d

Calculate the amount of sugar required to adjust the 3 kg of mango puree with an initial concentration of 25°Bx to a final concentration of 45°Bx.



- a : initial = 25°Bx
- b : purity of sugar = 100%
- c : desired = 45°Bx
- d : difference between b & c = 100 – 45 = 55
- e : difference between c & a = 45 – 25 = 20

To compute:

$$f = \frac{e}{d} = \frac{20}{55} = 0.364$$

Requirement: Amount of sugar needed to adjust 3 kg mango puree to 45°Bx.

$$0.364 \times 3 \text{ kilos} = 10.91 \text{ grams or } 1.091 \text{ kg sugar}$$

You will need to add 1.091 kg or 10.90.91 grams sugar to 3 kg of mango puree to have a final concentration of 45°Bx.