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DEPARTMENT OF BIOTECHNOLOGY

B.TECH

FOOD PROCESSING TECHNOLOGY LABORATORY

(17BTCC90)

HOD

PREPARATION OF ORANGE SQUASH

EXPT No:1

AIM:

To prepare squash from Orange

INTRODUCTION:

In India cold drinks are in demand practically throughout the year. Among these fruit juices acid squashes have an important place. These are quite popular being rich in essential vitamins, minerals and other nutrient.

Squash is a type of fruit beverage which contains at least 25 per cent of fruit portion (juice/pulp) and not less than 40 per cent of total soluble solids (sugar). In also contains edible acid in the range of 1-2 per cent. Since the sugar content in squash is quite less therefore to preserve it, approved chemical preservative such as sodium or potassium metabisulphite or sodium benzoate should be added along with colour and flavour. Squash can be prepared from fruits such as mango, orange, pineapple, litchi, lemon etc.

REQUIREMENT:

- Ripe fruits, Juice extractor:
- Pulper;
- Knives;
- Bottles;
- Utensil; and
- pp Cap sealing machine.

PROCEDURE:

- ✓ Select good quality fully ripe fruits;
- ✓ Wash and peel the fruit and extract juice as in orange, juice can be recovered
- ✓ Take sugar (1.5 kg), water(750 ml) and citric acid(25-28g)
- ✓ Mix the ingredients and give one or two boils to dissolve the sugar;
- ✓ Cool the sugar syrup, and add the fruit pulp;
- ✓ Mix the pulp and sugar thoroughly and pass through a muslin cloth;

- ✓ Add approved colour and flavour (essence);
- ✓ Add preservative i.e. potassium/sodium metabisulphite *(KMS/SMS)@*
- ✓ O.7g/litre or sodium benzoate (SB)@ 1.0g/litre of finished product; and
- ✓ Fill the squash in sterilized bottles and seal it with pilfer proof (PP) Cap and store in cool dry place.

OBSERVATION

S.NO	PRODUCT	Weight of fruit(kg)	Weight of Pulp(kg)	Vol of Sugar (Kg)	Vol of water(ml)	Quantity of Citric acid(g)	Total Product (L)	Approx.Cost (Rs)

PREPARATION OF JAM AND JELLIES

Expt :2

PREPARATION OF JAMS :

Jam is a product made by boiling fruit pulp with sufficient quantity of sugar to a reasonably thick consistency, firm enough to hold the fruit tissues in position. Apply, sapota, papaya, plums, mango, grapes, jack, pineapple, banana, guava and pears are used for preparation of jam. It can be prepared from one kind of fruit or from two or more kinds.In its preparation about 45% of fruit pulp should be used for every 55% of sugar.The FPO specification of jam is 68.5% TSS, 45% of fruit pulp and 0.5-0.6% of acid (citric acid) per 100 gm of the prepared product.

a) Selection and preparation of fruit: Select good quality ripe fruits. Wash the fruits well in cold water. Peel the fruits and remove the stones and corers present. Cut the peeled fruit into small pieces with a stainless steel knife. If the fruit is hard, it should be cut into very small pieces. Pulp the fruits by using pulper.

b) Addition of sugar and acid

c) Cooking: Cook the mixture slowly with occasional stirring.The fruit pulp should be crushed with a laddle during cooking. Continue cooking till the temperature of the mass reaches 105.5o C. Sheet (or) Flake Test A small portion of jam is taken out during boiling in a spoon or wooden laddle and cooled slightly. It is then allowed to drop. If the product falls off in the form of a sheet (or) flakes instead of flowing in a continuous stream (or) syrup, it means that the end point has been reached and the product is ready. Otherwise boiling is continued till the sheet test is positive.

d) Packaging: Fill the hot jam into clean dry sterilized jars. Allow the jam to cool and fix the sterilized lid to the jar. Store in a cool place. Process Ripe firm fruits → Washing → Peeling →Pulping (Remove seed and core) → Addition of sugar and acid → Boiling (with continuous stirring) → Judging of end point by further cooking upto 105o C (or) 68% TSS (or) by sheet test → Filling hot into sterilized bottles → cooling → Sterilized bootles → cooling → Waxing → Capping → Storage (at ambient temperature).

PREPARATION OF JELLY:

A jelly is a semi solid product prepared by boiling a clear, strained solution of pectin containing fruit extract, free from pulp, after the addition of sugar and acid. A perfect jelly should be transparent, well set but not too stiff, and should have the original flavour of the fruit. It should be of attractive colour and keep its shape when removed from the mould. It should be firm enough to retain a sharp edge but tender enough when it is pressed. It should not be gummy, sticky or syrupy or have crystallized sugar.The product should be free from dullness with little (or) no syneresis (weeping) and neither tough nor rubbery. The FPO specification for jelly is the final product should have 65% solids, 45% fruit extract and 0.5-0.75% acid. Guava, sour apple, plum, karonda, wood apple, papaya and jack fruit are rich in pectin and generally used for preparation of jelly. Pineapple, strawberry grapes etc. can be used but only after addition of pectin powder, because these fruits have low pectin content. Preparation of jelly is similar to that of jam. Process Fruit (Firm, not over ripe) → Washing → Cutting into thin slices → Boiling with water (1 ½ times the weight of fruits for about 20-30 min) → Addition of citric acid during boiling (2 g per kg of fruit) → Straining of extract → Pectin test (for addition of sugar) → Addition of sugar → Boiling → Judging of end point (sheet / drop / temp test) → Removal of scum (or) foam (one teaspoonful of edible oil added for 45 kg sugar) → Addition of colour and remaining citric acid → Filling hot into clean sterilized bottles → Waxing (paraffin wax) → Capping → Storage at ambient temperature. Important considerations in jelly making Pectin, acid, sugar (65%) and water are the four essential ingredients. Pectin test and determination of end point of jelly formation are very important for the quality of jelly.

PREPARATION OF TOMATO SAUCE

Expt : 3

Tomato is grown in our country in abundance, both in summer and winter seasons, but those grown in winter are superior in quality because they contain more total solids. They are a good source of vitamin C. Often they are sold at distress prices during the peak harvest season and nearly 25% of the produce is spoiled due to mishandling. Such losses can be avoided by converting tomatoes into delicious products like paste, puree, juice, ketchup and sauce. This processing of tomato will not only minimize the chances of distress sale but also permit the growers/ their dependents to generate more income. The quality of a tomato product is judged by its colour, which is dependent on the redness of the tomatoes used. In fact, the red pigment (lycopene) can be used as an index of the amount of tomato actually present in a product. High quality tomato products can be prepared only by: (i) using plant-ripened uniformly red tomatoes as the yellow and greenish portions not only mask the red colour but also cause browning due to oxidation; (ii) avoiding prolonged heating, and cooling the product quickly after preparation; and (iii) not using iron and copper equipment at any stage of processing. Lycopene (selfoxidizing isomer of carotene) turns brown when it comes into contact with iron. Iron also forms black compounds with the tannin in the tomatoes and the spices used. Equipment used should be glass-lined or made of stainless steel

PRINCIPLE :

Tomato products are prepared from ripe tomatoes and preserved by chemical preservatives or by heat application.

REQUIREMENTS :

Raw materials, equipment and apparatus

1. Tomato, spices, etc.

2. Pulper

3. Filter cloth / sieve

4. Pans of suitable size

5. Heaters

6. Thermometer

7. Crown corking / capping machine

8. Corks / caps

9. Sterilizer/Pasteurizer

10. Volumetric flask

11. Measuring cylinder

12. Weighing balance

13. Potable water

CHEMICALS AND REAGENTS:

1. Salt

2. Sugar

3. Citric acid/Vinegar

4. Spices

PROCEDURE :

a) Tomato Juice Plant-ripened, fully red fruits are selected, discarding all green, blemished and over-ripe fruits. A good quality juice should be of deep red colour, possess the characteristic taste and flavour of tomato, contain about 0.4 % acid (in terms of citric acid), be uniform in appearance and have high nutritive value. In addition the juice should contain 0.5% salt, and 1% sugar. An average of 10 kg of tomatoes yields 7 litres of juice. Wash tomatoes, remove stems, and trim off bruised or discoloured portions. To prevent juice from separating, quickly cut about 0.5 kg of fruit into quarters and put directly into saucepan. Heat immediately to boiling while crushing. Continue to add and

crush freshly cut tomato quarters to the boiling mixture. Make sure the mixture boils constantly and vigorously while you add the remaining tomatoes. Simmer 5 min. after you add all pieces. Press heated tomatoes through a sieve or food mill to remove skins and seeds. Heat juice again to boiling. Hot pulping is superior to cold pulping because in the latter case, extraction of juice is somewhat difficult and its yield is less, vitamin C is oxidized more rapidly, the juice is lighter in colour and there are chances of microbial spoilage. On commercial scale, a pulper or continuous spiral press is used for juice extraction but in homes tomatoes are strained through a steel sieve. To one litre of juice add 10g of sugar, 5g of salt, 1g of citric acid and 1g of sodium benzoate. Herbs, onion, garlic, and spices may be added to meet individual's taste requirements.

b) b) Tomato Sauce/Ketchup It is made from strained tomato juice or pulp and spices, salt, sugar and vinegar, with or without onion and garlic, and contains not less than 12% tomato solids and 25% total solids. General considerations: About one-third of the sugar required is added at the time of commencement of boiling to intensify and fix the red tomato colour. If the whole quantity of sugar is added initially, the cooking time will be longer and the quality of pulp will be adversely affected. Generally, the sugar content in ketchups/sauces varies from 10-26%. On the other hand, salt bleaches the colour of the tomato product. It is, therefore, desirable to add it towards the end of the cooking process. Spices are generally added in powdered form to the product by spice bag method. Instead of whole spices, essential oils of spices, oleoresins and spice extract can also be used. Essential oils, however, do not give the characteristic true aroma of whole spice but oleoresins provide true aroma. At present, spice extract is used in many industries for sauce/ketchup preparations. These do not adversely affect the colour of the product and are generally added a few minutes before the end of cooking. The salt content of the product should be 1.3-3.4%. Good quality vinegar is essential for the preparation of high quality sauce/ketchup. It should contain 5.0-5.5% acetic acid and should be added when the product has thickened sufficiently, so that the acid is not lost by volatilization. Tomato sauce/ ketchup generally contains 1.25-1.5% acetic acid. Sometimes glacial acetic acid (100% acetic acid) is used which is colourless and cheaper than vinegar. In order to increase the viscosity and prevent the separation of pulp form clear juice, pectin can be added to the extent of 0.1-0.2% by weight of the finished product. The ketchup

should be filled hot (about 88°C) to prevent browning and loss of vitamins during subsequent storage. If it is made from tomatoes of good quality, using sugar, salt, vinegar and spices in the correct proportion, it does not spoil for a fairly long time, even after opening the sealed bottle, if the latter is kept in a cool and clean place. It is, however, advisable to add 0.025% sodium benzoate to the product before bottling and then pasteurize the bottles as a precaution against spoilage during the 3 to 4 weeks that the ketchup remains in the opened bottle before it is used up. Recipe: Tomato pulp 1 kg, sugar 75g, salt 10g, onion (chopped) 50g, ginger (chopped) 10g, garlic (chopped) 5g, red chilli powder 5g, cinnamon, cardamom (large), aniseed, cumin, black pepper (powdered) 10g each, clove (headless) 5 numbers, vinegar 25 ml or glacial acetic acid 5 ml and sodium benzoate 0.25g per kg final product.

PREPARATION OF MANGO PICKLE

Expt:4

REQUIREMENT:

1 kg – Kairi (unripe mango)

100 gm – Mustard seeds

10 gm – Fenugreek seeds (you can add little less if you don't like bitter taste)

100 gm – Salt

3-4 tsp – Chilli powder, depending upon the taste and type of chillies used. Kashmiri chilli powder gives good colour.

1 1/2 tsp – Turmeric powder

1 tsp – Hing (Asafoetida)

250 gm – Oil

METHOD:

Day 1

*Wash raw mangoes well. Dry them completely. Cut into small pieces.

*Keep in a big steel/glass vessel. Add one teaspoon of turmeric powder and the salt (preferably take sea salt/ jade mith). Salt should be heated in a pan so that no moisture remains in it.

*Keep overnight.

Day 2

*Grind mustard seeds (rai) to make fine powder.

*Fry methi seeds in oil till crispy. Crush them.

*Add rai powder, methi seeds powder and chilli powder to the raw mangoes. Mix well.

Day 3

*Take oil in a pan, heat it and add mustard seeds. When they start spluttering, add 1 tsp of hing and half tsp of turmeric powder.

*Allow it to cool down to room temperature.

*Pour the oil on the raw mangoes mixed with all spices.

*Pickle is ready.

*Please ensure that there is enough oil that it floats above the mango pieces.

Take a look at Diwekar's post:

PREPARATION OF FRUIT BAR

EXPT :5

INTRODUCTION:

Fruit bar are delicious and nutritious products. The manufacturing process is simple. And the commercial manufacturing is a highly profitable business. Fruits are highly perishable items. Additionally, fruits are only available on the seasonal basis. Therefore, different types of value-added processed fruit products are commercially very successful. It can be predicted that few entrepreneurs may enter in this venture along with other food base product.

METHOD:

Fully ripe mango fruits

Washing and peeling of fruits

Extraction of pulp

Homogenizing the pulp in mixer

Storing in deep freeze at-18ºC

Mixing the ingredients in the pulp according to recipe

Heating the content for five minutes

Cooling at room temperature

Adding 0.1 per cent KMS and mixing Pouring the pulp in an aluminium tray

Drying at 60ºC for 10 hours

Repeating the above procedure to make second and the third layer Cooling and cutting the bar in rectangular pieces

Packaging Labelling Storing at ambient temperature condition

PREPARATION OF FROZEN PRAWN

Expt :6

Freezing of headless shell- on shrimp

1) Raw material: only shrimp of bigger size are frozen in this style. Raw material should be very fresh before processing.

2) Head removal and grading: Remove the heads and put the shrimps of different size in different trays. Fix the grades depending upon the average weight of the individual shrimps;

3) Washing: Wash the shrimp thoroughly in chilled water with 5-10 ppm chlorine. All the protruding viscera and reproductive organs should be removed as far possible. They are pulled out with forceps if necessary. Drain the shrimp thoroughly.

4) Weighing and Packing: Weigh the required quantity of shrimp according to pack weight adding 5% of the weight in excess to make up the weight loss on thawing.

5) Pack the weighed shrimp in polyethylene lined freezing trays or carton boxes

6) Introduce the grade slip at the bottom of the pack.

7) Add pure chilled water to the pack so as to cover the shrimp completely.

8) Introduce the packs into the freezer and freeze at –40ºC.

9) Remove the packs from the freezer and pack into the master cartons and store at – 20ºC or below

PREPARATION OF CHILLI SAUCE

Expt: 7

Green chilli sauce is an inherent element of Indo-Chinese food culture. It is a hot condiment made primarily with freshly chopped green chillies and flavoured with vinegar and a dash of garlic. Green chilli sauce is so versatile that it can be used as a flavourful seasoning for noodles, a spicy dip for your crisps and a savoury spread

REQUIREMENT:

Prepare 25 to 30 chopped green chillies, 1 medium-sized diced onion and chop 6 to 8 thick cloves of garlic. Keep 1 ½ cup of water, 1 tbsp sugar, 1 tsp salt, 4 tbsp vinegar and 1 tsp oil ready for the cooking process. Clean and dry an airtight glass jar for storing the homemade chilli sauce.

PREPARATION:

Heat oil in a pan and add green chillies, onion and garlic. Keep stirring regularly for two to three minutes until they get softened and the raw smell of onion and garlic disappears. Now, pour the water and add the salt and sugar. Cook on medium-high heat with the lid on for 15 minutes. After 15 minutes, switch off the flame and keep the mixture aside to cool.

Put the sauteed chillies, garlic and onion in the blender and add vinegar. Then blend into a smooth paste. Some people like to leave their sauce chunky. You can also do that by not blending the chillies all the way. Adding vinegar acts as a natural preservative and elongates the shelf-life of your homemade green chilli sauce. It also adds a nice, tangy flavour to the sauce.

The best way to protect the green chilli sauce from the risks of oxidation or fungal attack is to pour it to a clean, airtight container and store it in the refrigerator. It can used for up to 3 months. Be sure to keep it in the fridge when it is not being used.

This optional step is for the people who love adding an extra swing of flavour to their green chilli sauce. Heat 1 tsp oil in a pan and add a pinch of asafoetida. Add the pureed green chilli sauce to the pan and saute for two minutes. Then, add ½ tsp cumin powder and ½ tsp

coriander powder. Mix well and cook for another two minutes. Switch off the flame and let your green chilli sauce cool before transferring it to an airtight container and storing it in the fridge.

PREPARATION OF BREAD

Expt

INTRODUCTION:

Whole wheat bread is produced using whole wheat flour (atta). The bread is not only nutritious but also has typical wheat aroma. Whole wheat flour requires more water to prepare the dough in view of higher water absorption capacity of bran. In the preparation of whole wheat bread lesser fermentation time of 45-60 min and additives like potassium bromate or ascorbic acid, sodium stearoyl-2-lactylate,fungal alpha amylase and dry gluten are required.

Brown bread is normally made by mixing wheat flour (maida) and whole wheat flour (atta) in the ratio of 50:50. The processing conditions and additives used are the same as whole wheat bread. The volume of brown bread is generally better than whole wheat bread. Incorporation of malt extract or brown sugar improves colour and flavour of bread.

Fruit bread is made by sponge and dough method and about 20% of fruits are added in the dough stage. The formulation is the same as sweet bread.

Milk bread is prepared using sweet bread formulation and should contain atleast 6.0 milk solids. Generally 6.0% skimmed milk powder is added. Addition of milk improves the nutritional quality ofbread.

5.2.1 Principle

Preparation of four varieties of bread namely whole wheat bread, brown bread, fruit bread and milk bread and evaluation for crust and crumb characteristics.

5.2.2 Requirements

- Mixer having capacity for j-4kg dough.
- Cabinet for fermentation and proofing dough capable of maintaining constant of30oC and 75-85% relative humidity.
- Sheeter and moulder.
- Baking pans - test baking pans and pans to bake 400g bread.
- Baking oven capable of maintaining temperature of 220°C .

• Thermometer: dough testing: - capable of reading to 50°C with graduations to 0.1 QC, oven testing:- capable from lOO-260°C

• Tuner.

• Loaf volume measuring device.

• Balances: coarse and fine (0.1 and 0.001 g respectively), scoops, spatulas, pipets, graduated cylinders, bowls etc.

• Chemicals: Ascorbic acid, calcium propionate, glacial acetic acid, sodium stearoyl-z-Iactylate, fungal alpha amylase.

• Ingredients: Wheat flour, whole wheat flour, salt, sugar, compressed yeast, fat (dalda), dry gluten powder, tuity fruity, skimmed milk powder.

PREPARATION:

Weigh the ingredients accurately.

• Dissolve yeast, salt, calcium propionate separately in part of total water and add to mixing bowl.

• Place whole wheat flour, fat, SSL paste, dry gluten powder, fungal alpha amylase, ascorbic acid chemical and acetic acid into mixing bowl. Use the dough hook and mix the dough at speed I for 2-3min and at speed II for 4-5min. If necessary stop mixer before optimum development to scrape downsides of the bowl. Remove dough from the bowl and round it to smoothen the surface.

• Place the dough into a greased bowl, cover a wet cloth and let it ferment in the fermentation cabinet maintained at 30oC, 75% RH for 60 min.

• . Remix or knock back the fermented dough, divide the dough into 165g (2 Nos.), 450g (2 Nos.), round the dough and relax for 10-15 min.

• Sheet the dough and mould into a cylindrical shape.

• Place 165g and 450g moulded dough pieces into well greased test baking pans and bread pans with lid respectively.

• Proof the 165g dough for 55 min and 450g for about 40-50 min (till the dough surface touches the rim)

• Bake 165g dough open type and 450g dough with closed lid for 25 min at 220°C.

• Remove breads from the pan and cool on the rack.

• Pack the breads in polypropylene bags for evaluation, the next day.