

Development of Mango and Tomato Paste and It's Physico-Chemical Characterization

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ABSTRACT

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Mangoes are most widely used in cuisine. The Soil requirement for cultivation of Mango tree is a hardy perennial and evergreen tree and it can be grown on a wide range of soils. Value added product such as Milk Shakes can be obtained from fresh pulp of Mango which acts as an excellent source of Vitamin-A and flavonoids. Similar to that high quality Tomato product can be prepared from tomato pulp by using uniformly ripened, red colour tomato. Thus Tomato is nutritious and mostly eaten as processed fruit. So the importance of Climatic Fruit in food industries for the manufacturing of value added Product has received great attention. So the objective of present study is to analyse the composition of mango and tomato and to develop the pulp, and also to know its shelf life which favour the health benefits.

Keywords : Mango, Tomato, Paste, Pulp, Shelf life, Microbial Analysis.

I. INTRODUCTION

Mango (*Mangifera indica L*) is one of the popular tropical fruit which belongs to the family *Anacardiaceae*. Among the tropical fruits, Mangoes are commercially grown in more than 80 countries according to the climatic and Soil Condition.

Mango trees usually grow upto 35–40 m tall, with a radius of 10 m. The trees are long-lived, as some specimens still fruit after 300 years. There are different types of named mango cultivars. In mango

orchards, several cultivars are often grown in order to improve pollination. The 'Alphonso' is the common monoembryonic cultivar, which is considered as an important export product. It is also known as "The King of Mangoes".

Tomato (*Solanum lycopersicum L*) is common and most popular fruit cultivated across the world. Tomato species is originated in western South America and Central America. It is comparatively quite hard and highly Nutritive Fruit. It shines with

other fruit crops in productivity, adaptability, Minerals & vitamin C content.

As a source of different types of vitamins, minerals and phenolic antioxidants, tomato can be ranked as the first comparing all the fruits and vegetables. The richest sources of the antioxidant lycopene which possibly cares the cells from oxidants that have been associated to cancer can be obtained from either Fresh or processed tomatoes. Tomatoes contain high amounts of β -carotene, niacin, riboflavin, thiamine, magnesium, iron, phosphorus, potassium and sodium.

Pulp can be defined as a mass of pressed fresh fruit or vegetable matter which can't be suitable for immediate consumption. Pulp is mushy but can contain fruit parts or sometimes even whole fruits. It must always be soft, moist part of a fruit with a proper consistency.

The retaining property of the nutrients in fruit is more in the fruit pulp and thus preferred in various food and beverage products. Fruit pulp is more beneficial as compared to juice concentrate since it is rich in fiber content due to the presence of crushed membrane of the fruit.

Pulp is used for the production of jams, marmalades, jellies, sweets, drinks and fillings of baked goods. The pulp can be treated with the sorbic acid or sulphuric acid during processing for the preservation purpose. The main factor that drives the adoption of the fruit pulp is the Shelf life. The Shelf life of Fruit pulp is longer than the Fresh fruit. The Longer Storage life without the alteration to the natural content and Flavour is the main factor that leads to the increasing the global market demand for the fruit pulp.

The specific objectives of this study were as follows:

To analyze proximate composition of mango and tomato and to develop pulp.

To know the shelf life and acceptability health benefits of the product.

II. METHODOLOGY

Mango pulp is prepared by well ripened Mango, which has been checked during the unloading of mango near the Ripening Chamber. The Ripening Chamber was cleaned with the help of water jet pump before unloading the fruit. After drying the Chamber, the fruits are unloaded according to the capacity of Chamber for artificial ripening with the help of Ethylene gas.

The Ripened Mangoes is brought to the manufacturing unit near the washing area after 24 Hours from Chamber. Acceptable Mangoes were passed through conveyor belt into the Chlorinated washing Tank at 10 ppm. The fruits were passed from Primary Fruit washing tank into the Secondary Washing tank. Secondary Washing tank helps to remove chlorine residue from Fruit surface. These washed fruit is transferred to the cutting table where the tip and damaged portion of fruit is removed with the help of stainless steel knife. Then fruit is passed into the destoner where it scoops out the pulp by removing stone and the peels from the fruit. The Pulp is collected in Pulp Collection Tank. The Pulp is heated at 60°C in a heat exchanger with the help of hot water. The Sample is taken to check physico chemical analysis such as Brix, Acidity, pH, etc initially. The Raw Pulp is passed through Decanter/separator to minimize Black or Brown Particles. If desired Acidity is not yet attained, add required amount of Citric acid monohydrate in the standardization tank. Now Transfer Pulp to Evaporator feed tank.

The Pulp is transferred to First effect of evaporator where it's heated at 60°C under vacuum to increase the brix. Then the pulp is transferred to Second effect of evaporator and it's heated with help of steam at 70°C under vacuum to achieve final brix. After desired brix is achieved, the pulp is transferred out of evaporator and is passed to sterilization tank.

Sterilization temperature is maintained from 110°C-115°C with the help of hot water in tubular heat exchanger. After reaching the Sterilization temperature, product is further passed through module of heat exchanger where pulp is allowed for cooling. Once temperature gets achieved, the pulp is filled in sterile aseptic bag inside the drum and it's stored for manufacturing of value added product.

Tomato paste was prepared by buying fresh tomato from the farmers and it's unloaded into the crates for the preparation of tomato paste. The Crates have been stored into the ripening chamber. During Processing the Tomatoes was taken from the ripening chamber and it's passed through washing tank to foreign substance present above the surface of tomato.

The Sorting of tomato was done after washing by passing the fruit into the conveyor belt. These Tomatoes was passed through the fruit miller where the tomato is been crushed and the outer skin is removed. The Paste is heated to 75°C in a preheater. Then the paste is transferred to the pulp finisher to filter the paste. The filtered paste is passed to the standardization tank to standardize the paste. The standardized Paste is transferred to the Evaporator feed tank.

The paste is passed to the first effect of the evaporator and it is heated at 75°C to increase the brix partially. After heating, the paste is moved to the second effect of the evaporator where it is heated under vacuum at 80°C to achieve the required brix. After the desired brix is achieved, the paste is transferred out to the sterilization balance tank and it is heated at 108°C-115°C. Once required filling temperature gets attained after cooling, normally 35°C - 38°C, the paste is been filled in aseptic bag inside the drum and it is stored for further processing.

PHYSICO-CHEMICAL ANALYSIS OF PULP:

$$\% \text{ of Total acid} = \frac{\text{Titre} \times \text{Normality of NaOH} \times \text{Eq.Wt of Citric acid} \times 100}{\text{Weight of Sample} \times 1000}$$

Determination of Acidity: Weigh 1gm of the sample in a conical flask. Add 3ml of distilled water and mix well. Add 2-3 of Phenolphthalein indicator into the sample. Titrate against 0.1 NaoH Solution till the end point of light pink colour is achieved.

Determination of Brix: Clean the surface of the Refracto meter with double distilled water and adjust to zero brix. After adjustment wipe out distilled water and add 2-3 drop of the pulp over the surface of the Brix meter .Close the coverlid and press the read bottom and note the reading on the display screen.

Determination of Consistency: Place the consistometer on a plain surface and close the gate of the consistometer. Fill the sample in the sample store block. Open the gate of the consistometer and observe the flow for 30 seconds. Note the reading of the flow rate after 30 seconds.

Determination of pH: Clean the pH meter Electrode with the distilled water. After wiping the water, dip the electrode in pH buffer Standard solution and adjust the pH as per the Standard solution range. Clean and wipe the pH meter with distilled water. Take sample in a beaker and dip the electrode into it and note the reading.

Determination of Black / Brown Particle: Keep a transparent glass plate on a plain white surface. Weigh 10 gm of the sample and pour the same on the glass plate. Place another glass plate above that and press smoothly the glass plate and spread the pulp between the two glass plate without air bubble. By Visual examination count the number of black and brown particles.

SHELF LIFE:

Shelf Life varies between different types of food products according to the type of processing methods. Shelf life also depends on the temperature of the product during which it is been processed and stored. Microbiological and Sensory analysis are the two main shelf life tests which ensures that the pulp can be stored for different duration at different temperature.

Normally, Tomato Paste is been stored for 24 months at ambient temperature. But mango pulp can be stored for 18 Months at ambient temperature and upto 24 months in cold storage temperature. The cold storage condition always helps the pulp to prolong the shelf life and prevent the microbial spoilage.

MICROBIAL ANALYSIS:

Detection of *Escherichia coli* (*E.coli*): An appropriate weight of EMB media agar taken in the plates and dissolved in distilled water. Prepared media is kept for autoclaving at 120°C for 20 min. And petri plates are placed inside the laminar flow unit for sterilization at 155°C-160°C for 1h. After sterilizing process, media is allowed to cool at specified temperature. For Fruit concentrates, the sample should be prepared always as a homogenate.

Two types of dilutions was prepared and selected for plating. Dilution should always in a manner that they would able to produce easy countable number of colonies on each plate. Now, Transfer 1ml of selected dilution to each of two petri dishes required per sample and pour 15ml of melted agar into each plate. After pouring the medium, mix sample thoroughly with agar and allowed agar for solidification. Invert the plate after solidification and place them in the bacteriological incubator at 37±1°C. The plates should be always dry nor be very wet. Thus the plate

is examined for 24 h and presence / absence of *E.coli* is noted.

Detection of *Salmonella*: Weigh 25 g of sample into the sterile container and add 220ml of sterile buffered peptone water into it. Blend them for 5 min and transfer homogenized mixture to screw cap jar. Let it stand for 65±5min at room temperature. Mix mixture well and incubate them at 35°C for 24 h. Transfer 1ml of mixture to 10 ml of Macconkey broth and incubate them at 35°C for 25±2h. After incubation streak a loopful incubated sample from Macconkey broth to Xylose Lysine deoxycholate agar and Macconkey agar and SS agar. Incubate the plates at 35°C for 24 hours. After incubation examine the plates for presence of *Salmonella*.

III. RESULTS AND DISCUSSION**Physico Chemical Analysis of Mango Pulp**

S.NO	TYPE OF ANALYSIS	TRIAL 1	TRAIL 2	TRAIL 3
1	Acidity, %CA	0.68	0.71	0.69
2	Brix, °B	21.06	21.15	21.76
3	Consistency	4.0	4.3	4.2
4	pH	3.87	3.88	3.85
5	Black Specks	NIL	NIL	NIL
6	Brown Specks	03	02	05
7	Taste	Characteristics of Totapuri Mango	Characteristics of Totapuri Mango	Characteristics of Totapuri Mango
8	Appearance	Homogenous	Homogenous	Homogenous
9	Colour	Golden Yellow	Golden Yellow	Golden Yellow
10	Flavour	Typical of Natural Totapuri Mango	Typical of Natural Totapuri Mango	Typical of Natural Totapuri Mango

Physico Chemical Analysis of Tomato Paste

S.NO	TYPE OF ANALYSIS	TRIAL 1	TRAIL 2	TRAIL 3
1	Acidity, %CA	2.23	2.18	2.26
2	Brix, °B	28.07	28.19	28.39
3	Consistency	5.9	6.2	6.0
4	pH	3.90	3.94	3.87
5	Black Specks	NIL	01	NIL
6	Brown Specks	04	02	03
7	Taste	Characteristics Tomato Paste	Characteristics Tomato Paste	Characteristics Tomato Paste
8	Appearance	Homogenous	Homogenous	Homogenous
9	Colour	Red Tomato Colour	Red Tomato Colour	Red Tomato Colour
10	Flavour	Typical Tomato Flavour	Typical Tomato Flavour	Typical Tomato Flavour

Microbial Analysis of Mango and Tomato Pulp:

S.NO	TYPE OF MICROBIAL ANALYSIS	TRIAL 1	TRAIL 2	TRAIL 3
1	E.coli	NIL	NIL	NIL
2	Salmonella	NIL	NIL	NIL



Measurement of Zone of Inhibition using *Escherichia coli* for Mango Pulp



Measurement of Zone of Inhibition using *Salmonella Typhi* for Mango Pulp



Measurement of Zone of Inhibition using *Escherichia coli* for Tomato Pulp



Measurement of Zone of Inhibition using *Salmonella Typhi* for Tomato Pulp

Health Benefits of Mango Pulp:

Maintain Heart Health: Mango Pulp contains high amounts of nutrients such as Magnesium and potassium. Thus it can help to maintain a healthy pulse and regulate blood pressure.

Maintaining of Eye condition: Mango Pulp has antioxidants such as lutein and zeaxanthin which accumulate in the retina of the eye that prevents absorbing excess light and harmful blue light.

Improves Hair and Skin condition: Vitamin A is high in mango pulp, improves the growth of hair and skin condition. The structure of the skin can be attained by Collagen, a protein that is present in the mango pulp.

Health Benefits of Tomato Paste:

Improves immunity: Tomato Paste contains high amounts of Vitamin C and Vitamin K content which

improves immunity and keeps body healthy.

Good for pregnant mothers: Intake of tomato paste during pregnancy may help protect newborn from neurological disorder, since it contains high amount of folic acid.

Lowers risk of cancer: Vitamin C and antioxidants like lycopene are rich in tomato. Thus eating tomato and its paste can protect the cells from damage and reduce cancer.

IV. CONCLUSION

The nature has blessed us with a wonderful flora and fauna, which has made our life beautiful. One of these wonders is a mango and tomato fruit.

Mango is one of the climacteric fruits which has a sweet taste that has different types of varieties according to the soil condition. It is liked by people of all age groups. Mango fruit has a short shelf life. Medicinal properties of mango are due to chemical constituents such as polyphenols, mangiferin, and glycoside saponin etc. The various parts of mango plant act as an excellent nutrient which is useful in the management of many diseases like ulcer, kidney stone, diabetes, diarrhea, etc. It can also be used as a diuretic, to promote eye health and also to lower cholesterol. Storage temperature is also another key factor in conserving mango, since these fruits are chilling sensitive and thus special care must be taken when cold storage is used. It is commonly consumed as one of the natural energy boosters as it contains fructose content.

Tomato is also an edible fruit that requires careful handling after harvest in order to maintain quality, extend shelf life & also to allow transport to markets outside the area of production. Production of tomato in India's is second in the world; hence the market

value in India is comparatively less. Tomato as number of Health benefits comparing to other Fruits.

Thus value added product such as Pulp can be made from mango and tomato fruit which can be available throughout the year and it is highly accepted all over the world by consumers since it has high health benefits.

Hence the value added product preparation from Mango and Tomato is beneficial.

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