I J R B A T, Issue (XIII) Volume (I) Jan 2025: 82-84
A Double-Blind Peer Reviewed & Refereed Journal
OPEN ACCESS
e-ISSN 2347 – 517X
Original Article
INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
 www.ijrbat.in

COMPARATIVE STUDY OF SUGAR-ACID RATIO AND VITAMIN C CONTENT OF NATURAL FRUIT JUICES AND COMMERCIAL JUICES

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Communicated :18.11.2024 | Revision: 22.11.2024 & 14.12.2024 Accepted: 26.12.2024 | Published: 30.01.2025

ABSTRACT:
The sugar-acid ratio and vitamin C is important for nutritional value. Vitamin C is an antioxidant molecule in plant and animal metabolism. Vitamin C is used to prevent and treat scurvy; During 2020 vitamin C was claimed for prevention and treatment of COVID-19. In present investigation the comparison of sugar-acid ratio and vitamin C of natural fruit juices and packed /commercial fruit juices were studied. It was observed that percentage of citric acid was found to be higher in lemon and lower in tomato natural juice. In case of packed juices less percentage of citric acid was found in orange juice while high percentage in litchi juice. In case of natural fruit juices high amount of sugar-acid ratio was found in tomato juice and less in lemon juice. Sugar-acid ratio is more in orange juice while less in litchi juice in case of commercial juice. Vitamin C was higher in lemon juice and lower in tomato juice in case of natural fruit juice. In packed or commercial fruit juices it is observed that vitamin C is lower in litchi and higher in orange juice. pH scale gives knowledge about the acidity. pH of lemon juice is lower and pineapple is higher indicating lemon is more acidic than any other fruits selected for investigation.

Keywords: - Sugar-acid ratio, Vitamin C, fruit juices.

INTRODUCTION :

The citrus and citrus products are a supply of vitamins, minerals and dietary fiber (non-starch polysaccharides) that are essential for traditional growth and development and over all nutritionary well –being. Citrus fruits are helpful for improving immune system digestion, brighten skin, increases metabolism and fight infection in case of human beings. At the beginning of the ripening process the sugar-acid ratio is low because of low sugar content and high acid content. The sugar-acid ratio increases after ripening of fruit. The sugar- acid ratio can be obtained from brix value. The sugar acid ratio in the fruits reflects the relative contents of sugars and acids. It is important indicator for flavor quality of citrus fruits .Fruit ripening is the process resulting in changes in colour, taste and texture, which make the fruit acceptable for consumption. The total soluble solids to titratable acid ratio is a key organoleptic quantity criterion for assessing the taste and palatability of fruits and estimates the amounts of sugars and organic acids in fleshy fruits according to Sammi and Masud(2007)[1]. TSS increased during storage as a result of hydrolysis of starch into sugars.[2,3] The regulation of sugar-acid ratio is of great significance to the improvement of citrus fruit quality. It was observed that the sugar-acid ratio of fruits in different eco-regions changed significantly from 150 days after full bloom. The main acids in blueberries are citric acid and malic acid(Beliz etal, 2009)[4]. Organic acids provide vitamin C and anthocyanins stability (Wang etal. 2009)[5] and together with sugars ensure a taste and aroma development. The effect of fruit composition on flavor is very complex. Sweet taste is positively correlated with glucose, sucrose and total sugars while it is negatively correlated with oxalic acid, citric acid, quinic acid and total acids (Belt-Gaber etal.2015).[6] The modest increase in urinary citrate excretion has been associated with gastrointestinal absorption of citric acid from

http://doi.org/10.29369/ijrbat.2025.010.1.0007

dietary source, citrate is the most abundant organic ion found in urine [7, 8].

Determination of Total Soluble Solids (TSS):

Total soluble solids of the fruit juices were determined as *Brix by exploitation Abbe's Refractometer.

Procedure:-Add a drop of juice on the prism in the direction of good light and focus the eye piece and take the reading.

Estimation of Sugar Acid Ratio:

Total Soluble Solid to acidity ratio (TSS: Sugar Acidity) was calculated by dividing the total soluble solid by % citric acid.

Sugar acid ratio = *Brix ÷ Citric acid %

Determination of %Citric Acid :

Experimental method –

Natural citrus fruit juices and commercial citrus fruit juices were titrated with standard sodium hydroxide solution. 10 ml of the juice sample + 30ml of distilled water and 3 drops of phenolphthalein solution was taken in a clean conical flask. Volume of NaOH required for each fruit juice was recorded and then calculate the % of citric acid content in juices was calculated.

% Citric Acid = ml of NaOH x 0.064

Determination of Total Soluble Solids (TSS):

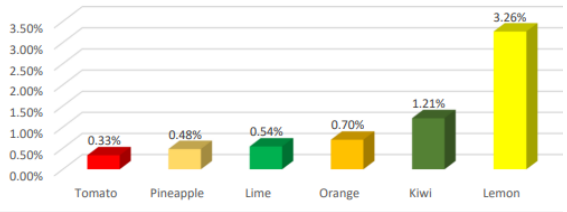
Total soluble solids of the fruit juices were determined as *Brix by exploitation Abbe's Refractometer. Sugar acid ratio = *Brix ÷ Citric acid %

Obsevations and Graphs.

1. % Citric Acid Content In Natural Fruit Juices:

Sr.no	Nameof Juice	Volume of Juice	Volume of NaOH	% of Citric Acid
1	Tomato Juice	10 ml	5.2ml	0.332%
2	Pineapple Juice	10 ml	7.6ml	0.486%
3	Lime Juice	10 ml	8.5ml	0.544%
4	Orange Juice	10 ml	11 ml	0.704%
5	Kiwi Juice	10 ml	19ml	1.216%
6	Lemon Juice	10 ml	51ml	3.264%

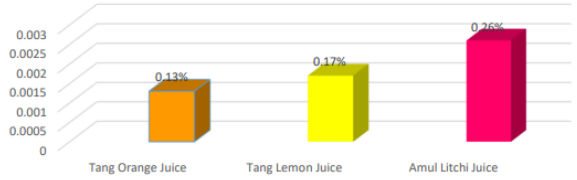
% Citric Acid Content In Natural Fruit Juices



% Citric Acid Content In Commercial Fruit Juices:

Sr.no	Name of Juice	Volume of Juice	Volume of NaOH	% Citric Acid
1.	Tang Orange Juice	10 ml	2.1 ml	0.1344%
2.	Tang Lemon Juice	10 ml	2.8 ml	0.1792%
3.	Amul Litchi Juice	10 ml	4.1 ml	0.2624%

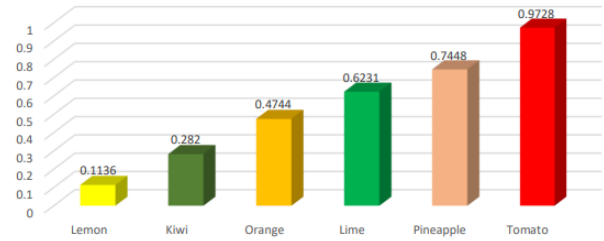
% Citric Acid Content In Commercial Juices.



Sugar Acid Ratio Of Natural Fruit Juices:-

Sr.no.	Name of Juices	*Brix (RefractometerReading)	Sugar Acid Ratio
1.	Lemon Juice	0.371	0.1136
2.	Kiwi Juice	0.343	0.2820
3.	Orange Juice	0.334	0.4744
4.	Lime Juice	0.339	0.6231
5.	Pineapple Juice	0.362	0.7448
6.	Tomato Juice	0.323	0.9728

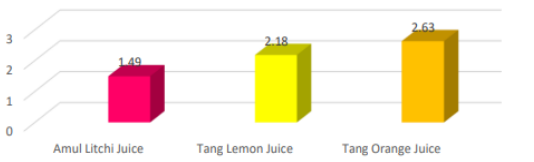
Sugar Acid Ratio Of Natural Fruit Juices



Sugar Acid Ratio Of Commercial Fruit Juices:

Sr.no.	Names of Juices	*Brix (RefractometerReading)	Sugar Acid Ratio
1.	**Amul Litchi Juice**	**0.352**	**1.49**
2.	**Tang Lemon Juice**	**0.354**	**2.18**
3.	**Tang Orange Juice**	**0.391**	**2.63**

Sugar Acid Ratio Of Commercial Fruit Juices

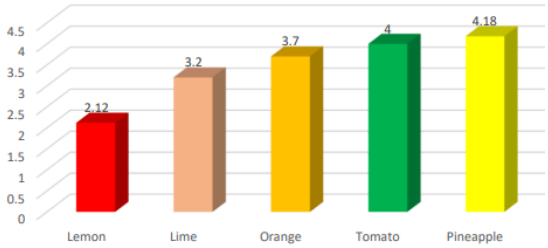


Vitamin-C Content In Natural Fruit Juices:

Sr.no.	Name of Juice	Volume of Juice	Volume of Iodine
1.	Tomato Juice	2ml	0.2ml
2.	Pineapple juice	2ml	0.3ml
3.	Orange Juice	2ml	0.5ml
4.	Lime Juice	2ml	0.6ml
5.	Lemon Juice	2ml	0.8ml

http://doi.org/10.29369/ijrbat.2025.010.1.0007

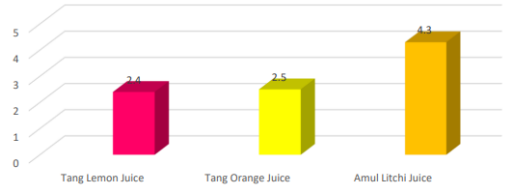
Vitamin-C Content In Natural Fruits.



6.Vitamin-C Content In Commercial Fruit Juices:

Sr.no.	Name Of Juice	Volume Of Juice	Volume Of Iodine
1.	Amul Litchi Juice	2ml	0.2
2.	Tang Lemon Juice	2ml	0.3
3.	Tang Orange Juice	2ml	0.4

Vitamin-C Content In Commercial Fruit Juices.



pH Values Of Natural Fruits Juices:

Sr.no.	Name Of Juice	pH Value
1.	Lemon Juice	2.12
2.	Lime Juice	3.20
3.	Orange Juice	3.70
4.	Tomato Juice	4.00
5.	Pineapple Juice	4.18

RESULT AND DISCUSSION :

Vitamin C, percentage of citric acid, sugar-acid ratio and pH of natural fruit juices and packed juices were studied. It was observed that percentage of citric acid was found to be higher in lemon and lower in tomato natural juice. In case of packed juices less percentage of citric acid was found in orange juice while high percentage in litchi juice. In case of natural fruit juices high amount of sugar-acid ratio was found in tomato juice and less in lemon juice. As far as packed juice sugar-acid ratio is more in orange juice while less in litchi juice. Vitamin C was higher in lemon juice and lower in tomato juice in case of natural fruit juice. In packed or commercial fruit juices it is observed that vitamin C is lower in litchi and higher in orange juice. pH of lemon juice is lower and pineapple is higher indicating lemon is more acidic than any other fruits taken for study.

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