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Quality Evaluation of Different Brands of Tetra Pack Mango Juices Available in Market

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Abstract:-
The study was conducted to evaluate the quality of different brands of mango juices packed in tetrapack for evaluation of nutritional quality .The physicochemical properties such as vitamins ,ascorbic acid, carbohydrates, pH, Acidity of four different brands of mango juices (Samples A_1, A_2, A_3, and A_4) in Indian market were evaluated .The pH of juices ranged between 1.36 to 1.87, Acidity 0.04 to 0.043, glucose 1.89 to 4.15 and ascorbic acid between 0.02 to 0.03 .The results of these juices obtained showed that the samples were fit for consumption.
Keywords:-mango, juices ,Ascorbic acid.

Introduction:-

Mango is one of the most highly priced desert fruits of the tropics. It has rich luscious, aromatic flavour and a delicious taste in which sweetness and acidity is delightfully blended. Mango production has experienced continuous growth in the last decades of the 20th century. The world's total annual mango fruit production was estimated at 22 million metric tones. Global production of mangoes is concentrated mainly in Asia and more precisely in India that produced 12 million metric tones per annum. In India, mango is grown in 10.85 million hectare and it occupied 39% of total fruit production. More than 25 cultivars of mango are cultivated commercially in various regions of India.[1][2] It is grown mainly in Kokan region of Western India.

Mango fruits can be processed into various products. Unripe mangoes are normally processed into pickles, preserves, dessert or chutneys while the ripe mangoes can be processed into dried mango chips, mango wine, mango juice, mango concentrate, mango jam, mango jelly, mango syrup and canned mango.[3]

Mango is one of the most cherished fruit not only for taste but also for nutritional value. In India mangoes are used as a blood builder, because of their high iron contents. They are suggested for the treatment of anemia, and beneficial to woman during pregnancy. It is good source of energy, vitamin A, vitamin C, etc.[4]. Mangoes processing is done to decrease post-harvest losses and extend shelf life, create variety and hence widen the market add value, thereby generating extra income; create new investment and employment opportunities and support local small-scale industry through the demand for equipment required for processing, preservation and packaging . Therefore, there is need to develop value added products to enhance mango utilization and minimize losses.[5]

Although food laws exist for the production of quality food products yet most manufacturers do not strictly comply with these laws. Food adulteration can prove very dangerous and can lead to diseases such as paralysis, cancer, mental retardation and hypertension, etc. Therefore it is essential to check food adulteration. One of the important measures in this regard is to create awareness amongst public regarding hygienic conditions. Impurities in food items sold in the market should be highlighted. Keeping in view this fact the present study was undertaken to evaluate quality and nutrition value of different mango juices available in the market. Various parameters like pH, free acidity, conductance, density, glucose, vitamin C, proteins, amino acids were analysed.

Methodology :

Four commercially available tetra pack (ready to drink) mango juices(A_1, A_2, A_3,and A_4) were taken. The samples were analyzed for various parameters like pH, free acidity, electrical conductivity, density, colour, temperature, glucose content, protein content, etc. which are as follows.

Determination of pH : In approximately 75 ml sample (both water and fruit juices) the pH electrode (digital pH meter model EQ-610) was immersed to record the pH.

Determination of Temperature :

In sufficient volume of sample the calibrated thermometer were inserted for sufficient period of time to permit constant reading and the temperature was recorded

Determination of Density :

The weight of empty density bottle (W_1gm) and weight of empty density bottle + sample was measured and density of water and mango juices were calculated by using following formula ;

$$\text{Density of juice sample } (\rho) = \frac{W3 - W1}{V}$$

Where, W_1 = Weight of empty density bottle
W_3 = Weight of empty density bottle + juice sample

V = Volume of density bottle.

Determination of Electrical Conductivity :

In a clean beaker, 75 ml of samples were taken and conductivity cell (Conductivity meter model No EQ-660) was immersed in it. Then the electrical conductivity was recorded.

$$S = K \times G$$

Where, S = Electrical conductivity of samples in ms cm^{-1}.

K = Cell constant in cm^{-1}.

G = Conductance in ms.

Determination of free acidity :

Take 10 ml of sample fruit juice in a clean dry conical flask and titrate it against standardized sodium hydroxide (NaOH) solution with 3 – 4 drops of phenolphthalein indicator. The pink color developed should persist for at least 10 seconds. Note the volume of standard sodium hydroxide solution required. We can calculate free acidity of fruit juices by using following formula;

$$\text{Free acidity (N)} = \frac{\text{N} \times \text{Volume of NaOH}}{\text{volume of sample}}$$

Where , N = Normality of NaOH used.

Estimation of Glucose by Benedicts Solution :

Prepare standard glucose solution by dissolving accurately weighed about 3 gm of glucose in 500 ml distilled water and prepare glucose solution.

- In a clean 250 ml beaker take 50 ml of Fehling A and add 50 ml of Fehling B. Mix thoroughly. An intense blue color solution is obtained.
- Pipette out 10 ml of this solution in china dish, add 30 ml of distilled water and keep the china dish over a wire gauge on tripod stand.
- Fill the burette with standard glucose solution and place above china dish so that the glucose solution can be directly added to the Fehling solution.
- Heat the Fehling solution to boiling and add (1 ml) glucose from burette to Fehling solution. Boil the solution and continue the addition until the blue color changes to brick red. Record the end point.
- Repeat the same procedure for fruit samples to get the end point.
- Weight of glucose in samples can be calculated as follows;

$$\text{Weight of glucose (g)} = \frac{(W2 - W3) \times V1}{V2}$$

Where, W_2 = weight of empty bottle + glucose

W_3 = weight of empty bottle after transfer

V_1 = volume of std. glucose required

V_2 = volume of sample required

Estimation of amino acids by Ninhydrin method:

Cover all test tubes with aluminum foil and place it in water bath for 15 minutes.

Cool the tube by placing them in cold water.

Then add 1 ml 50 % ethanol in all test tubes and read optical density at 570 nm.

Concentration of unknown amino acids can be calculated by using following formula;

$$\text{Concentration of amino acid (g/ml)} = \frac{O.D\ of\ unknown}{O.D\ of\ Standard} \times conc.\ of\ std.$$

Determination of Vitamin-C by Iodometric Titration :

- Pipette out 20 ml of aliquot of the sample solution into a 250 ml conical flask and add about 150 ml of distilled water and 1 ml of starch indicator solution.
- Titrate the sample with 0.005 mol L^{-1} iodine solution. The end point of the titration is identified as the first trace of a dark blue-black color due to starch-iodine complex.
- Repeat the titration with further aliquots of the sample solution until you obtain concordant results.
- Calculate the average volume of iodine solution used from your concordant titres.
- Calculate the moles of iodine reacting.
- Using the equation of the titration (below) determine the number of moles of ascorbic acid reacting.

Ascorbic acid + I_2 → 2 I^- + Dehydroascorbic acid

Estimation of Protein by Follin Lowry Method :

Concentration of protein can be calculated by using following formula;

$$\text{Concentration of protein (g/ml)} = \frac{O.D\ of\ unknown}{O.D\ of\ Standard} \times conc.\ of\ std.$$

Observations:-

Table 1 : *Physicochemical analysis of different brands of tetra pack Mango Juices*

Experimental Analysis performed in laboratory at room temperature :

Parameters	A1	A2	A3	A4
pH	1.85	1.36	1.87	1.58
Free acidity	0.046 N	0.0414 N	0.0432 N	0.0432 N
Conductance	0.368505	0.36765	0.366795	0.36594
Density	1.062	1.0611	1.0573	1.0627
Glucose	2.31 %	4.158 %	1.89 %	4.158 %
Amino acids	0.286 g/L	0.268 g/L	0.382 g/L	0.487 g/L
Vitamin-C	0.0309 g/L	0.0309g/L	0.0264 g/L	0.0220 g/L
Proteins	33.5 g/L	44.6 g/L	49.1 g/L	82.1 g/L

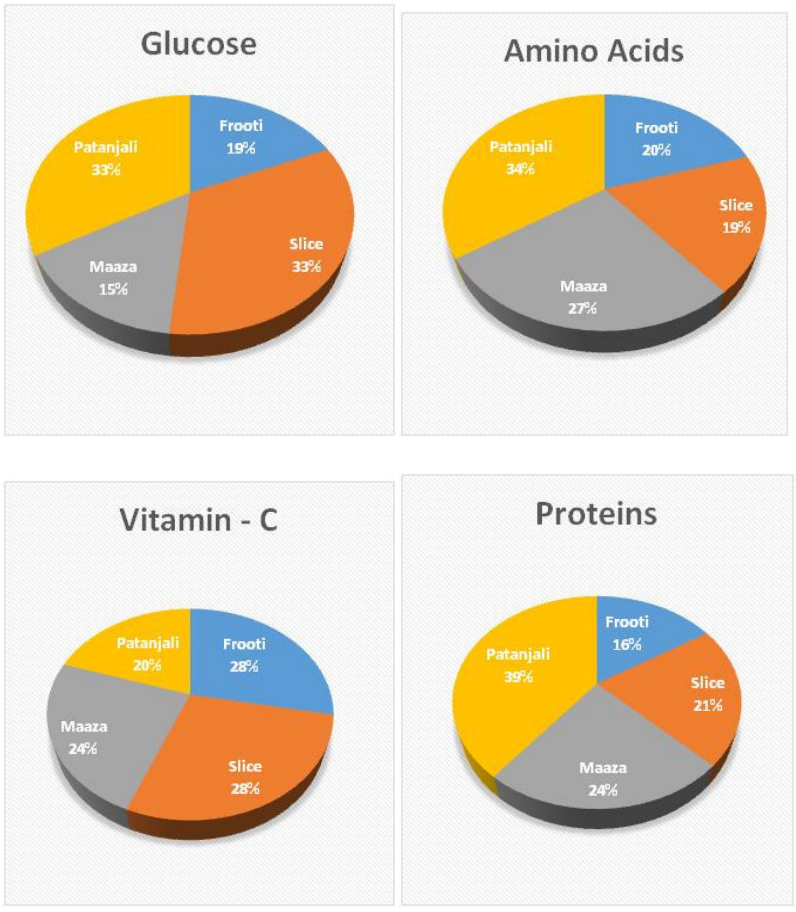
Result, Discussion and Conclusion

This study was conducted to evaluate the quality of juices by studying their physicochemical parameters.

Protein is one of the most important component of food. Results showed that mango juices were poor source of protein. High level was investigated in sample A_4 i.e., 39 % and low level for sample A_1 i.e., 16 %, whereas sample A_2 and A_3 were found in same range 15 to 23 %. The values of pH were recorded in the range of 1.4 to 1.8. Higher pH was in sample A_3 followed by A_1. Higher pH values may be due to loss of acidity and it plays a vital role in flavor.[6] Glucose was found in the range of 18.9 gm/l to 41.58 gm/l. Sample A_2 and A_4 contains highest glucose while sample A_1 and A_3 contain lower glucose content.

Ascorbic acid is an important constituent of fruits. Its deficiency produces a disease called scurvy. It is the most difficult task to preserve vitamins during dehydration.[7]. The maximum level of ascorbic acid was found in $A_1$and A_2followed by A_3 and A_4.

Pi Charts for various parameters of Mango Juices:-



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