



Mixed Fruit Juices and Drinks

Nine the wiser, or is there a best brand?

From a health perspective, fresh juice is of course preferable but its limited availability during off seasons may make the packaged variant a convenient choice for consumers. And does this convenience entail any compromise, in the sense that the processing bit may also reduce the quantity of nutrients and enzymes inherently available in the fresh fruits? Several domestic and multinational companies are marketing their brand of fruit juices/fruit beverages/fruit drinks from juice concentrates, adding permitted preservatives and colouring substances for better acceptability. Are they all generally safe for consumption, keeping in mind the possibility of contamination by pesticide residues or heavy metals like lead and arsenic? What factors determine the quality and taste of the juice/drink? Do you know that added sugar is not permitted in the pure (100%) juices? It is permitted only in beverages/drinks. Do you know that there is a limit for added synthetic colour in juices/drinks? It is such and other aspects that we have sought to capture in a parameter-by-important parameter testing of nine popular brands in the market.

A Consumer Voice Report

When fruits are made into pulp or juice, they are bound to lose some of their important fibres and vitamin content. These drinks usually contain more sugar than the actual fruit. The following report assesses, among other things, the sugar profile of three brands of mixed fruit juice and six of ready-to-serve fruit drinks. Other key parameters that we tested included total soluble solids (TSS), acidity, added synthetic colour, nutritional contents (energy

value, carbohydrates, iron, sodium, etc.), presence of heavy metals, pesticide residues, preservatives, and microbiological activity.

As per brands' declarations, the major ingredients in fruit juices are water (as reconstituted from juice concentrate) and mixed fruit juice, and a fractional percentage of antioxidant, acidity regulator and preservatives. In fruit drinks/beverages, the major ingredients are water, mixed fruit juice and sugar including added sugar, and a fractional percentage of antioxidant, acidity regulator and preservatives.

While there is no reliable method as yet to detect percentage of juice content, our test results assure us that the nine brands fulfil the minimum requirements and are safe for human consumption. While there were some variations, these were well within the specified limits.

The tests were conducted at an NABL-accredited laboratory and as per requirements specified in Food Safety and Standards (FSS) Regulations, 2011, related Indian Standards and manufacturers' declarations.

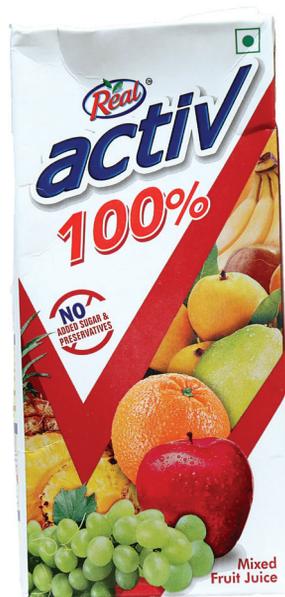
CV RECOMMENDATIONS | TOP PERFORMERS

Mixed Fruit Juice
Real Activ

Ready-to-Serve Fruit Drinks/Beverages
Real Fruit Power

VALUE FOR MONEY

Ready-to-Serve Fruit Drinks/Beverages
Real Fruit Power



Key Findings

- Based on the overall test findings, Real Activ and Real Fruit Power are the top performers in their respective categories.
- The value-for-money brand in the 'ready-to-serve fruit drinks/beverages' is Real Fruit Power.
- Density, which measures the quality of the juice/drink, was found highest in Real Activ and Patanjali in their respective categories.
- Glucose and fructose were found highest in Real Activ and Pantanjali in their respective categories.
- Highest energy value was found in Real Activ and Minute Maid in their respective categories..
- In sensory panel tests, the highest score was obtained by Minute Maid among fruit drinks and by Real Activ among mixed fruit juices.
- Total soluble solids were highest in Real Activ and Patanjali in their respective categories.
- All the brands passed the tests for presence of heavy metals and microbiological and pesticide residues, and are safe for consumption.
- Net weight in Tasty Treat was 1,918 ml, against the declared 2,000 ml, and in Patanjali it was found to be 982 ml against the declared 1,000 ml – both beyond the tolerance limit of Legal Metrology Rules.

| Rank | Total Score out of 100 (rounded off) | Brand | Ingredients Declared |
|--|--------------------------------------|--------------------------|---|
| Mixed Fruit Juices (100%) | | | |
| 1 | 89 | Real Activ (100%) | Water, mixed fruit juice conc. (6.80%), pineapple juice conc. (2.72%), apple juice conc. (1.7%), grapes juice conc. (1.7%), pear juice conc. (0.68%), orange juice conc. (5.5%), apple juice conc. (4%), banana puree (4%), mango pulp (3.8%), apricot puree conc. (2.5%) |
| 2 | 83 | Tropicana 100% | Water, concentrated mixed fruit juice 24.2% (from apple, mango, guava, orange, banana, apricot, peach) |
| 3 | 82 | 24 Mantra Organic (100%) | Water, organic mango pulp (20%), organic guava pulp (8%), organic pineapple juice (11%), organic apple juice conc. (6.4%), organic orange juice conc. (3.8%) |
| Ready-to-Serve Fruit Drinks/Beverages | | | |
| 1 | 90 | Real Fruit Power | Water, mixed fruit conc. (12.03%), apple juice (4.27%), orange juice (0.7%), guava puree (0.7%), apricot puree conc. (0.65%), mango pulp conc. (0.5%) banana puree (0.46%), lime juice conc. (0.28%), passion fruit conc. (0.23%), guava puree conc. (0.18%), pineapple juice conc. (0.5%), sugar |
| 2 | 89 | Patanjali | Treated water, mixed fruit base added with white guava, mango pulp (27%), sugar |
| 3 | 86 | Minute Maid | Water, sugar, mango pulp (10.7%), guava pulp (2.9%), banana puree (2.9%), papaya puree (0.3%) |
| 3 | 86 | Tasty Treat | Water, sugar, mixed fruit pulp (13.5%), (reconstituted orange juice (4.5%), mango pulp (4%), white guava pulp (2%), papaya (2%), pineapple (1%) |
| 4 | 85 | Del Monte | Water, pineapple juice (reconstituted from pineapple juice conc. [21%]), sugar, mango pulp (5%), guava pulp (1%) |
| 4 | 85 | Tropicana | Water, concentrated mixed fruit juice 12.2% (from banana, apricot, pineapple, mango, orange, apple, lime and strawberry), sugar |

Score Rating: >90: very good*****, 71–90: good****, 51–70: average***, 31–50: poor**, up to 30: very poor*

Note: Due to limitation of test methodology, percentage of juice content was not quantified.

Thermally processed fruit juices (canned, bottled, flexible and/or aseptically packed) means unfermented but fermentable product – pulpy, turbid or clear – intended for direct consumption. These are obtained by a mechanical process from sound, ripe fruit or the flesh thereof, and processed by heat, in an appropriate manner, before or after being sealed in a container, so as to prevent spoilage. The juice may have been concentrated and later reconstituted with water suitable for the purpose of maintaining the essential composition and quality of the juice.

TESTED

| | MRP (Rs) | Cost per 100 ml (Rs) | Net Volume | Best before (months) | Manufactured/Marketed by |
|--|----------|----------------------|------------|----------------------|--|
| | 120 | 12 | 1 litre | 7 | Dabur India Ltd |
| | 120 | 12 | 1 litre | 6 | Pepsico India Holdings Pvt. Ltd |
| | 149 | 14.9 | 1 litre | 9 | Sresta Natural Bioproducts Pvt. Ltd |
| | 99 | 9.9 | 1 litre | 7 | Dabur India Ltd |
| | 85 | 8.5 | 1 litre | 6 | Patanjali Ayurved Ltd |
| | 99 | 9.9 | 1 litre | 6 | Hindustan Coca-Cola Beverages Pvt. Ltd |
| | 130 | 6.5 | 2 litres | 6 | Future Consumer Enterprises Ltd |
| | 35 | 14.58 | 240 ml | 18 | Field Fresh Foods Pvt. Ltd |
| | 99 | 9.9 | 1 litre | 6 | Pepsico India Holdings Pvt. Ltd |



Packaged Juice versus Fresh Juice

One may very well be confused about the difference between fresh juices made at home or at a juice shop and the packed ones available at the grocery store. Benefits of each are given below:

- Freshly squeezed juice at home or the street vendor's has to be consumed within half an hour or so, while packaged juice has a longer shelf life and also retains its taste and nutritional quality.
- Fresh juice may develop acidity after the extraction. Packaging allows the fruit juice to remain fresh.
- From a health perspective, fresh juice is always preferable but it has limited availability during off season.
- When a whole fruit is pressed or squeezed to make juice, some of the nutrients, most notably fibre and the water-soluble vitamins, are lost in the process.
- Studies show that drinking juice in the morning on an empty stomach – or at least half an hour before a meal – is the most beneficial time of the day to have fresh juice. This is when your stomach is empty and hungers for food, and will absorb anything you consume.

TEST RESULTS FOR PHYSICOCHEMICAL PARAMETERS

Sugar Profile | Total Soluble Solids | Acidity as Citric Acid | Density | Added Synthetic Colour

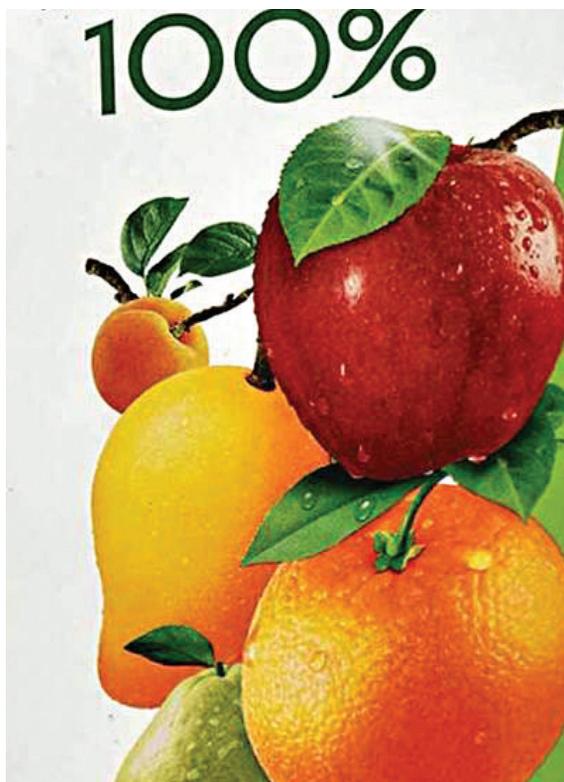
◆ Sugar Profile

Here, the juice is checked for three major sugar constituents: fructose, sucrose and glucose. These ingredients lend natural taste and uniform texture to the product. Sugar is added to enhance product acceptability and also to add to the reconstituted juice/beverage the attributes of natural taste and flavour.

- *Glucose was found highest in Real Activ among mixed fruit juices and in Patanjali in the fruit drinks category. It was lowest in 24 Mantra and Del Monte in their respective categories.*
- *Fructose was found highest in Real Activ and Patanjali in their respective categories. It was lowest in 24 Mantra and Minute Maid in their particular categories.*
- *Sucrose was found highest in Tropicana 100% and Minute Maid in their respective categories. It was lowest in Real Activ and 24 Mantra among mixed fruit juices, and in Patanjali among fruit drinks.*

Did you know?

In the pure (100%) juices, added sugar is not permitted; in beverages/drinks it is permitted.





A large part of the sugar found in fruit juice is fructose. The liver is the only organ that can metabolise fructose in meaningful amounts.

Sucrose is found naturally in many fruits and vegetables, but usually in small amounts. When a fruit does contain sucrose, the amount of that sucrose can rapidly increase during ripening, which may in part explain why ripe fruits taste sweeter than under-ripe fruits.

Total Sugar

While some nutrients are lost during processing, 100 per cent fruit juice from concentrate with no added sugar is a relatively healthy beverage that is comparable to freshly squeezed juice. By contrast, juice drinks and juice cocktails from concentrate have refined sugars and flavours added to them and are not healthy for your body when consumed in large quantities.

- *Total sugar was highest in Real Activ among mixed fruit juices and in Real Fruit Power among fruit drinks.*

◆ Total Soluble Solids (TSS)

TSS denotes the combined content of all inorganic and organic substances contained in a liquid which are present in a molecular, ionised or micro-granular suspended form. The higher the TSS, the better the quality of the fruit juice/drink is. As per FSS Regulations, TSS will not be less than 10 per cent in fruit juices and drinks.

- *Total soluble solids were found to be above the minimum requirement of 10 per cent in all the brands.*
- *TSS was highest in Real Activ among mixed fruit juices and in Patanjali among fruit drinks. It was lowest in Tropicana and Del Monte in their respective categories.*

◆ Acidity as Citric Acid

Total titrable acidity is the total amount of acid in the juice/drink. Acidity improves the taste and increases the shelf life of the product but excessive acidity may also spoil the taste of the juice/drink. Acidity of packaged fruit juices is to be as well balanced as possible to make it safe for consumption. It shall not be more than 3.5 per cent.

- *All brands conformed to the specified limit.*

Comparative Test

◆ Density

Density is defined as mass per unit volume. It reveals how dense the end product is – the denser the product is, the better is the quality of juice.

- Highest density was found in Real Activ among mixed fruit juices and in Patanjali among fruit drinks. The variations among the brands were marginal.

◆ Added Synthetic Colour

While the product may contain permitted added synthetic colour, the maximum permissible limit is 200 ppm (mg/litre).

- Added synthetic colour was detected in Del Monte and Tasty Treat – however, the same was within the permitted limit and was also declared on the label. It was not detected in any of the other brands.

PHYSICOCHEMICAL

| Parameter↓ | Weightage (%) | Mixed Fruit Juices (100%) | | |
|------------------------|---------------|---------------------------|----------------|----------------|
| | | Real Activ 100% | Tropicana 100% | 24 Mantra 100% |
| Sugar profile | 13 | 11.21 | 10.14 | 9.93 |
| Total soluble solids | 8 | 6.75 | 6.18 | 6.27 |
| Acidity as citric acid | 5 | 4.4 | 4.55 | 4.25 |
| Density | 3 | 2.58 | 2.37 | 2.43 |
| Added synthetic colour | 3 | 3 | 3 | 3 |

FOR NUTRITIONAL CONTENTS

Energy Value | Carbohydrates | Ascorbic Acid | Sodium | Iron

◆ Energy Value

Energy value is the amount of calories which our body obtains from food. Energy values (in kcal) are calculated and compared with the declared value by manufacturer. The higher the energy value in juice, the better it is considered to be.

- Highest energy was found in Real Activ (58.2 kcal/100 gm) among mixed fruit juices, and in Minute Maid (66.5 kcal/100 gm) among fruit drinks. In the fruit drinks category, lowest energy value was in Del Monte (58.6 kcal/100 gm).
- For all brands, energy value was higher than the declared value.

◆ Carbohydrates

Carbohydrates are the most common source of energy for us. The higher the carbohydrate amount,

the better the quality of the fruit juice/drink is considered to be.

- Highest carbohydrate was found in Real Activ among mixed fruit juices and in Minute Maid among fruit drinks.

◆ Sodium

Sodium shall be as per declaration and it should not be present in a high quantity.

- In the case of brands that declared their sodium, it was found to be as per declaration. Sodium was highest in 24 Mantra (22.1 mg/litre) among mixed fruit juices and in Minute Maid (207.9 mg/litre) among fruit drinks.

◆ Iron

It should be as per declaration/claim.

- All brands that declared their iron quantity met the specified requirement. Iron was highest in Real Activ in mixed fruit juices and in Tropicana among fruit drinks.

Heavy Metals

We tested the brands for any trace of lead and arsenic. Lead, a cumulative poison, enters the product either through the soil or during production. It accumulates in the body and causes irreversible damage to the brain, nerve cells, red blood cells and the kidneys. Ingestion of a large amount of arsenic can lead to gastrointestinal symptoms such as severe vomiting, high blood pressure, heart attack, etc.

- Both lead and arsenic were below detection limits (0.4 mg/litre for lead and 0.02 mg/litre for arsenic). Another heavy metal, chromium, was also below detection limit.

SCORES

| | Ready-to-Serve Fruit Drinks/Beverages | | | | | |
|--|---------------------------------------|-----------|-------------|-------------|-----------|-----------|
| | Real Fruit Power | Patanjali | Minute Maid | Tasty Treat | Del Monte | Tropicana |
| | 10.63 | 12.2 | 8.51 | 12.7 | 9.1 | 9.16 |
| | 7.14 | 7.68 | 7.17 | 7.3 | 6.82 | 7.17 |
| | 4.4 | 4.4 | 4.55 | 4.55 | 4.7 | 4.25 |
| | 2.61 | 2.82 | 2.64 | 2.67 | 2.56 | 2.64 |
| | 3 | 3 | 3 | 2.7 | 2.7 | 3 |



Packed and Preserved

Benzoic acid and sulphur dioxide

Preservatives are added to preserve the texture, flavour, appearance, crispness and colour of the fresh fruit. Sugar is also used to preserve fruit juices.

Benzoic acid and sulphur dioxide are preservatives that are added to juices and beverages to prevent microbial growth or undesirable chemical changes. The maximum permissible limits are 350 ppm for sulphur dioxide and 600 ppm for benzoic acid.

- *Benzoic acid and sulphur dioxide were not detected in the 100% juices. In fruit drinks, highest quantity of preservatives were found in Tasty Treat; Real and Minute Maid had the least amount of preservatives, while none was detected in Tropicana.*

Ascorbic acid

Manufacturers sometimes use ascorbic acid as a preservative, antioxidant or colour stabiliser, or to boost vitamin C content. It is a water-soluble vitamin and a powerful antioxidant, it helps the body form and maintain connective tissue, including bones, blood vessels and skin.

- *Ascorbic acid was highest in Real Activ (61.7 mg/100 ml) among mixed fruit juices and in Real Fruit Power (23.6 mg/100 ml) among fruit drinks. It was lowest in Tropicana 100% and Tasty Treat in their respective categories.*

NUTRITIONAL

| Parameter↓ | Weightage (%) | Mixed Fruit Juices (100%) | | | |
|---------------|---------------|---------------------------|----------------|----------------|--|
| | | Real Activ 100% | Tropicana 100% | 24 Mantra 100% | |
| Energy value | 6 | 3.89 | 3.58 | 3.6 | |
| Carbohydrates | 4 | 3.2 | 3.01 | 2.98 | |
| Ascorbic acid | 3 | 3 | 1.2 | 1.59 | |
| Sodium | 2 | 2 | 2 | 1.96 | |
| Iron | 2 | 1.8 | 1.64 | 1.77 | |



All Pass

Microbiological activity

Microbiological tests were conducted on the fruit juices/drinks to assess their microbial load and to check for the presence of pathogenic bacteria. Due to improper or poor hygienic condition during the manufacturing process, microorganisms may occur in the finished product. All the brands were tested for such microbiological activities as total bacterial count, coliform count, E. coli count, and yeast and mould count. Incubation testing was also carried out.

- All the brands passed in the microbiological tests and can be considered safe for consumption.

Pesticide residues

Pesticide is a chemical or biological agent (such as a virus, bacterium, antimicrobial, or disinfectant) that deters, incapacitates, kills, or otherwise discourages pests. Pesticides may cause acute and delayed health effects in people who are exposed. Such adverse health effects range from simple irritation of the skin and eyes to more severe effects like affecting the nervous system, mimicking hormones causing reproductive problems, and causing cancer.

We conducted tests for 51 pesticide residues as per requirements of FSSAI.

- All the brands were found within the limits specified by the national standard and thus passed the tests.

CONTENTS SCORES

| | Ready-to-Serve Fruit Drinks/Beverages | | | | | |
|--|---------------------------------------|-----------|-------------|-------------|-----------|-----------|
| | Real Fruit Power | Patanjali | Minute Maid | Tasty Treat | Del Monte | Tropicana |
| | 5.69 | 5.66 | 5.9 | 4.92 | 3.98 | 4.37 |
| | 3.68 | 3.65 | 3.81 | 3.52 | 3.17 | 3.33 |
| | 2.54 | 2.01 | 1.72 | 1.2 | 2.45 | 1.24 |
| | 2 | 2 | 0.6 | 1.8 | 2 | 2 |
| | 1.4 | 1.4 | 1.16 | 1.28 | 1.64 | 1.8 |

FOR SENSORY ATTRIBUTES

Sensory panel tests tell us what really makes a product most acceptable/least acceptable, irrespective of the price. These help in determining the overall organoleptic (sensory) quality of the product. For fruit juices/drinks, the tests were conducted as per our standard procedure – in a test lab under the guidance and supervision of trained experts. The following parameters were judged and rated by the panellists:

colour and appearance, texture, flavour/aroma, and taste and aftertaste. Panellists gave their scores on a 10-point scale and the average score for a given brand was obtained from that.

- Real Activ was the most liked brand among the mixed fruit juices; in fruit drinks category it was Minute Maid, followed by Real Fruit Power.
- 24 Mantra and Tasty Treat were the least favoured brands in their respective categories.

Comparative Test

FOR GENERAL QUALITIES

Marking/Labelling

The following details shall be marked on each pack:

- Name and category of product
 - Manufactured/Marketed by
 - Batch number
 - Date of manufacture
 - Net volume (ml)
 - The words 'best before'
 - MRP (Rs)
 - Standard mark, if any
 - Juice percentage/Pulp percentage
 - Whether it 'contains permitted colours and added flavours'
 - FSSAI license number
 - List of ingredients
 - Green dot
- All brands have given the necessary information on their packs.



Packing

Fruit juices should be packed in material that facilitates ease of use and also protects the product from atmospheric deterioration.

- With the exceptions of Del Monte (metal can) and Tasty Treat (plastic bottle), all the other brands have Tetra Pak packaging.

Minimum Fill

The product shall occupy not less than 90 per cent of space if packed in a metal container.

Del Monte, the only brand in our tests to be packed in a metal can, had 92.8 per cent filled, thereby fulfilling the minimum requirement.

Net Volume

According to Legal Metrology (Packaged Commodities) Rules, for 300 ml–500 ml the maximum permissible error in excess or in deficiency is 3 per cent; for 1,000 ml–10,000 ml the tolerance limit is 1.5 per cent.

- Tasty Treat and Patanjali were found to have less net quantity against their declared values – these were beyond the tolerance limit of Legal Metrology Rules.