

## Physico-chemical characterization of some fruits juices from Romanian hypermarket fruits

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### Abstract

Romanian vegetable market offers to the consumers, fresh and preserved fruits and vegetables from Romanian production and import, and only preserved fruit juice. The quality of all products depends of many factors, such as: variety, geographical characterization of the plantation, presentation (fresh or preserved) and the market season. For our study we tested some fresh fruits juices, obtained into laboratory, from Romanian hypermarket fruits. Thus, we analyzed the concentration of ascorbic acid, the total acidity, the content of sodium chloride, dry matter and humidity, ash, and the content of saccharose. For fresh juice we used fresh grapefruits, tangerines, oranges, pineapple, and Golden delicious apples.

**Keywords:** physico-chemical analysis, fruits juice

### 1. Introduction

Fresh fruits and fresh juices from vegetables and fruits are very good sources of valuable nutrients and completed our diet with essential vitamins (especially hydrosoluble vitamins) and minerals, dietary fibers, small quantities of lipids and proteins, being in the same time good sources of carbohydrates.

If the juice from fresh fruits respect the rules derived from Guide to Good Hygienic, Agricultural and Manufacturing Practices for the primary production, conditioning, packing, storage and transportation of fresh fruits, proposed by FAO [4], then drinking fresh fruits juice would be a very good habit for babies, children, adults, and old people to enhance their health status.

According with “United States Department of Agriculture” (Internet) the amount of fruits and vegetables in diet depends on age, height, weight, sex, physical activity. Even so, USDA recommends daily to eat fruits, but the quantity depends on the age (Table 1) [7].

**Table 1.** USDA recommended daily amounts for fruits

| Sliced fruits or fresh juice | Age categories |                  |
|------------------------------|----------------|------------------|
| 1 cup                        | Children       | 2 – 3 years old  |
| 1 ½ cup                      | Children       | 4-8 years old    |
|                              | Girls          | 9-18 years old   |
|                              | Boys           | 9-13 years old   |
|                              | Women          | 31-51+ years old |
| 2 cups                       | Boys           | 19-30 years old  |
|                              | Men            | 19-51+ years old |

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Thus, the daily amount of fruits is referring to fresh fruits or fresh juices, made from healthy fruits and consumed immediately after were made.

In human diet it is necessary to eat vegetables and fruits, and fresh brings more valuable nutrients, because after different processes of preservation the content of some nutrients decreases, especially some vitamins.

Consumption of fresh fruits and vegetables provide a healthy diet that can prevent some chronic diseases, such as cardiovascular and coronary diseases, diabetes (type 2), mouth, stomach, colon-rect cancer, prevent developing kidney stones, help decreases bone loss, obesity [2, 6]. Also, most of the fruits are low in calories, fat and sodium, but are good sources of potassium, dietary fibers, ascorbic acid, folic acid and carbohydrates.

Potassium helps the human organism to maintain the blood pressure in normal values and the best fruits sources of potassium are: apricots, banana, sweet cherries, kiwi, prunes, cantaloupe, and melon or orange juice [5].

Also, dietary fibers are more then necessary in humans' diet because helps to reduce blood cholesterol levels, stimulates the peristaltic movements and prevents the constipation. Some of the fruits with high content of dietary fibers are avocado, pear, banana, guava, mango, orange, and apple. It is very important to accentuate that the quantum of dietary fibers depends on the fruit and depends on the edible ingested part. Thus, the sliced or whole fruits with edible peel have much more dietary fibers then juice. Some of the fresh fruits juices can lose important percents of dietary fibers [7].

Ascorbic acid is a hydrosoluble vitamin, very important for growth, which helps in healing different wounds, kipping the gums and teeth healthy, and very important in capillary fragility treatment [3]. Best fruit sources of ascorbic acid are: rosehips, guava, lychee, papaya, strawberries, yellow kiwi, green kiwi, melon, orange, lemon, lime, red tamarillo. There are some fruits, not so common, which are not usually in shops and hypermarkets, but which very rich in ascorbic acid, such as: kakadu plum, camu camu, acerola, baobab, but these are fruits that can be consumed only by the people that live in the same habitat with the fruits' plant.

Folic acid or folate is another hydrosoluble vitamin that helps the red blood cells, and help developing the fetus in the first trimester of pregnancy. Oranges, strawberries, cantaloupe, melons are good food sources of folate [1].

## 2. Materials and methods

In our study all the fresh fruits used for fresh juice were bought from a Romanian hypermarket, from west of Romania – Timisoara city. The physico-chemical analyses were made in the winter time, and thus, the fruits were imported from other countries. However, the fruits were first sorted, and after that we selected only good quality fruits, we washed the fruits and prepared for obtaining juice. All preparations before making the juice were made in plastic or glass dishes, except the preparation of pineapple for taking out the peel. The juice was obtained using an electrical squeezer, after we cut the fruits in small pieces. Also, the preparation of fruits, making juices and the laboratory analysis were made in a very short time for preserving the quality of the fresh fruits juices. For fresh juice we used fresh grapefruits, tangerines, oranges, pineapple, and Golden delicious apples.

For our study we analyzed the concentration of ascorbic acid, the total acidity, the content of sodium chloride, dry matter and humidity, ash, and the content of saccharose.

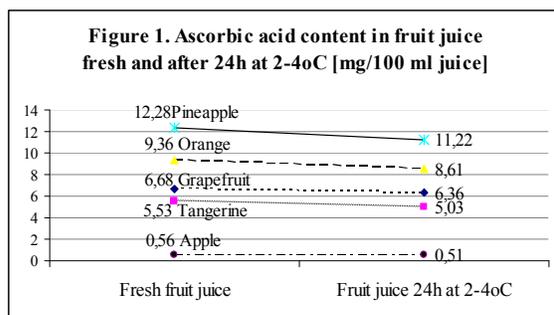
Ascorbic acid concentration was establish with 2,6-dichlorophenolindophenol method, the total acidity was made with titration with sodium chloride solution. For establish the content of sodium chloride we used Mohr method. Dry matter and humidity was determined by drying the samples into laboratory oven, and the ash was determined by mineralization into calcinations system. The content of saccharose was determined by refractometry.

The data were used then for calculate the results. We made 5 samples of fresh fruit juices from each fruit, and the fruits were represented by grapefruits, tangerines, oranges, pineapple, and apples. After we obtained the individual results, we made the average of every five samples and we represented graphically the mean result.

## 3. Results and Discussions

Ascorbic acid has important quantities in some fresh fruit juices, but after storage the concentration decreases very much [3].

In our experiment we produced fresh fruit juices from different fruits (from hypermarket, imported from other countries), and then we stored the juice in sealed glass containers at 2-4°C at refrigerator, right after the production, for 24 hours. The highest concentration of ascorbic acid was registered for pineapples fresh juice (P – 12.28mg/100ml), followed by oranges (O – 9.36mg/100 ml), the by grapefruits (G – 6.68mg/100ml), then tangerines (T – 5.53mg/100ml), and after that Golden delicious apple (A – 0.56mg/100ml) – figure 1.



The concentration of ascorbic acid after 24 hours of storage (at 2-4°C) decrease from 6.68mg/100ml to 6.36mg/100ml for grapefruit juice, and from 0.56mg/100ml to 0.51mg/100ml for apple juice. The loss of ascorbic acid was not so much, but it is very important to have fresh fruit juices for a valuable nutritive intake, especially for vitamins. We determine the total acidity for all samples of fresh juices, and then we calculate the concentration in some acids presented in fresh juices too, such as: citric, malic, tartaric and acetic acids – figure 2. Having in view the concentration of others acids, we can observe that – for the most of the samples – the highest concentration of analyzed acids was for citric acid, except the apple with a higher concentration of acetic acid. The highest content of citric acid was for registered for grapefruit fresh juice (1.85g/100ml) and the lowest was registered for apple.

The content of citric, malic, and tartaric acid decreases from grapefruit fresh juice to orange juice, tangerine juice, and then pineapple and apple juice. The concentration of acetic acid was much higher for apple fresh juice (4.89g/100ml juice) compared to others fresh juices, where the lowest content of acetic acid was observed for pineapple fresh juice (0.74g/100ml juice).

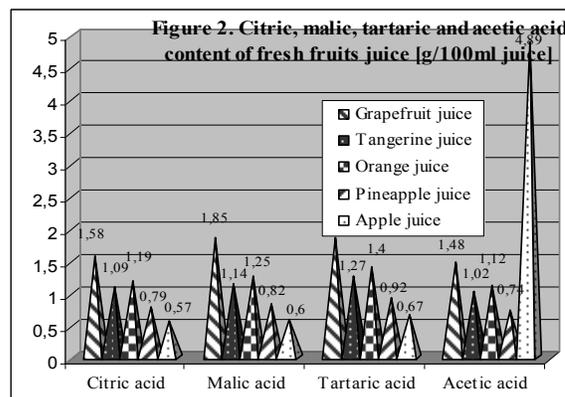
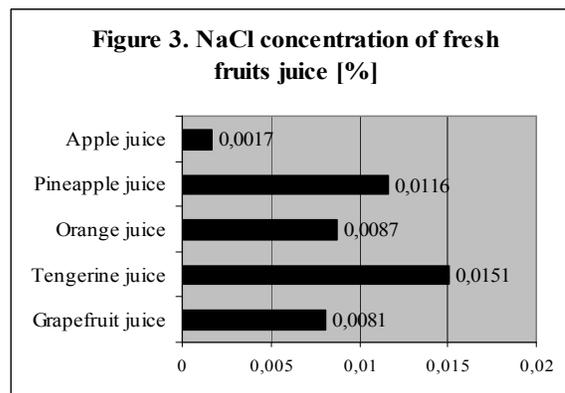


Figure 3 presents the concentration of sodium chloride in some fresh juice fruits, such as apple, pineapple, orange, tangerine and grapefruit.

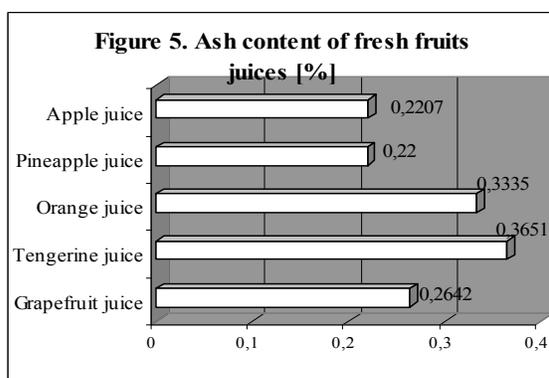
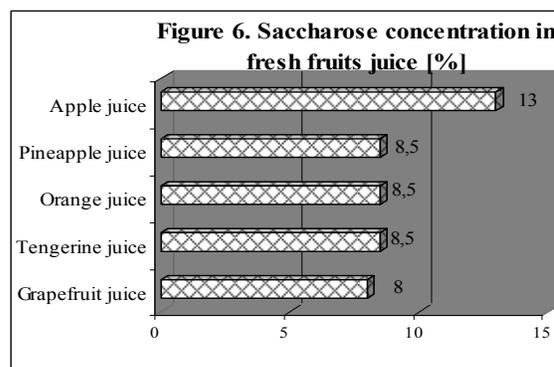
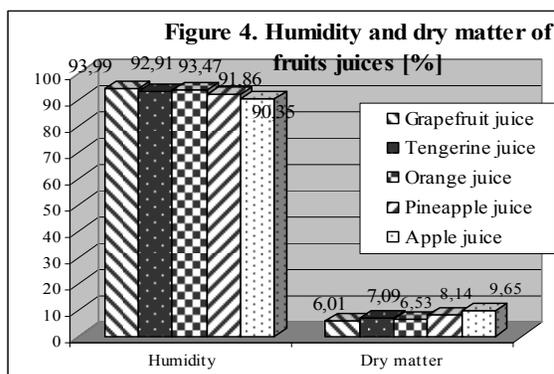


The concentration of NaCl in fruit juice is very low, varying from 0.0017% for apple juice to 0.0151% for tangerine juice. So, juice fruit is not a considerable source for NaCl in humans' diet.

The content of water in fresh fruit juices is very important in humans' diet because fruits are good hydrating foods, being rich in hydrosoluble vitamins and minerals. The tested juice fruits had over 90% of water content (90.35% - apple juice, and 93.99% grapefruit juice) – figure 4.

Dry matter content is calculated having in view the humidity, and the densest juice is apple fresh juice with 9.65% dry matter.

In figure 5 is presented the content of ash in fresh fruit juices after calcinations of samples



The ash was white, and the content of ash can express the content of minerals from our samples. Thus, pineapple fresh juice has the lowest content of ash (0.22%), but orange and tangerine fresh juices have the highest ash content (orange – 0.33% and tangerine – 0.36%).

Saccharose concentration of fresh juices had values between 8% and 13%. Saccharose gives the sweet taste to the juices – figure 6.

Thus, the sweetest juice, with the highest content of saccharose was apple fresh juice (13%), followed by pineapple, orange and tangerine fresh juice that all had 8.5%, the then grapefruit fresh juice with 8% saccharose. Some of the fruits are very important for their saccharose content and for their dietary fiber content. Having this arguments, it is recommended to consume the hole fruit then to drink the fresh juice, because the loss of dietary fibers in the case of fresh juice fruits.

#### 4. Conclusion

Fruit fresh juices are foods that are very good in humans' diet because of their hydrosoluble vitamins, mineral, dietary fiber and water content. The fruits are good in all four seasons' diet, and we can find fruits on the market in the most countries of the world, even in winter.

Fresh juices are good sources of ascorbic acid (vitamin C). From our study, the best fresh fruit juices source of ascorbic acid is pineapple, followed by orange, grapefruit, tangerine and then by apple. Also, after stored at 2-4°C for 24 hours, the loss of ascorbic acid was between 4.79% for grapefruit and 8.93% for apple fresh juice.

The concentration of others acids, was the highest for citric acid, except the apple with a higher concentration of acetic acid. The highest content of citric acid was for registered for grapefruit fresh juice and the lowest was registered for apple. The concentration of acetic acid was 4.89g/100ml for apple fresh juice (lowest) compared to others fresh juices, where the lowest content of acetic acid was observed for pineapple fresh juice – 0.74g/100ml juice.

Fruits are poor sources of sodium chloride for humans' diet. Fresh fruit juices are low in NaCl, but very good for hydration – having over 90% of water, and are good drinking natural products for minerals content (ash content).

Saccharose content varies from 8% for grapefruit fresh juices to 13% for Golden delicious apple juice. Orange, tangerine and pineapple had the same saccharose content of 8.5%.

As final conclusion, the fresh fruits juices are good nutritive products, being natural products with important concentration of some micronutrients and water. If the sanitation condition are complied, then fresh fruit juices should be apart of everyone's diet, as healthy diet habits.

#### Acknowledgements

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