

## PHYSICO-CHEMICAL CHARACTERISTICS FOR SOME GREEN PLANT JUICES ASSORTMENTS

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### Abstract

Due to their nutritional and biological potential, natural juices from green fruits and vegetables are foods with multiple implications for the body's balance both physically, mentally and emotionally. Consumed moderately, as part of a balanced diet, green herbal juices offer properties that promote good health, reducing the risk of illness. With high vitamin, mineral, fiber and antioxidant content, green juices from vegetables and fruits are increasingly appreciated and recommended. The green juice made from apple (*Malus domestica*) cucumber (*Cucumis Sativus*) spinach (*Spinacia oleracea*) and parsley (*Petroselinum crispum*) has an antioxidant, detoxifying and alkalinizing role, contributes to improving the health of the body.

The purpose of this study was to analyze and compare some physico-chemical characteristics: pH, electrical conductivity, dynamic viscosity and refractive index in case of the juice samples obtained from apples, spinach, cucumber, parsley and lime each taken separately and in the mixture.

**Keywords:** green vegetables and fruits juices, physical-chemical characteristics

### Introduction

Juice is a liquid obtained by squeezing, from fruits, vegetables, and sometimes from herbs [2] The energizing, vitaminizing, refreshing drink, natural juices are prime for a balanced lifestyle. It is recommended, prophylactic and curative, as an adjuvant when the body accumulates large amounts of acids; which has repercussions such as diabetes, aging, gout [1].

The quality of the juices depends both on the quality of the processed raw materials and on the correctness of the technological process. Pressing fruits and vegetables gives raw juice as a result of centrifugation, filtration, enzymatic clarification, cleansing or freezing, being converted in to clear juice. Top quality juices have flavor, color, taste and smell specific to the fruits of origin and are clear [3,4]. In fruits and vegetables there are small amounts of mineral substances, but their importance to the good functioning of the body is extremely high. Along the vitamins and ferments, they guide all the chemical transformations witch take place in the fruit and vegetables, as well as in the human body. The most common mineral substances are: calcium, potassium, magnesium, iron, sulfur, phosphorus, silicon, chlorine [ 6,8]

Apple belongs to the Rosaceae family, occupies the first place in the temperate climate of fruit trees species, due to its fruit value. Apples are rich in sugars, organic acids, ascorbic acid, protein substances, pectic substances, minerals, vitamins (C, A, B<sub>1</sub>, B<sub>2</sub>, PP). Apples have therapeutic effects in the following diseases: ischemic cardiopathy, diarrhea, hypertension, chronic hepatitis, constipation, insomnia, arthritis.

Cucumber is part of the family Cucurbitaceae, an annual plant. Cucumber fruits have a diversified content in nutritional principles containing: 96% water, dry substance 4-6%, 1.7% carbohydrates, 0.7-1.1% pectic substances, 0.44-0.57% mineral salts and vitamins (ascorbic acid, pantothenic acid, nicotinic acid, complex B) [5].

Parsley is a biennial plant of the Umbelifere family. The root and leaves are consumed both raw and prepared with indications in circulatory diseases, general and nervous stimulant with depurative effects, act in the control of pinworms, digestive tonic, remedy of kidney diseases, liver, heart [6].

Spinach is part of the family Chenopodiaceae and is native to Central Asia. The importance of spinach leaves food is reflected in 7 to 11.3% dry substance content, 1.5-3.5% sugars, protides 2 to 3.7%, 40-70 mg of C vitamin, B<sub>1</sub> 0.15 mg, B<sub>2</sub> 0.20 mg and mineral salts (K-520 mg, P-160 mg, Ca-130 mg, Fe-8mg); values reported on 100 mg of fresh product. For therapeutic purposes it is recommended in cases of anemia, rickets, senescence, physical and nervous asthenia, eczema, burns, scurvy [5].

Green juice is considered a miracle drink, being a combination of vegetables, herbs and even green fruits, which act as an intravenous infusion of vitamins, minerals and enzymes.

Because they are in the form of a juice, easily digested and assimilated, its components go directly into the system and fill the body with nutrients and energy in less than 20 minutes. Green juice has a great advantage because, unlike fruit juice, it contains less sugar and calories. Because the taste of such a "vitamin bomb" is not very pleasant, it can be sweetened by the addition of fruit [7].

## **Experimental**

A green juice from vegetables and fruits was prepared for this work, because it provides the body with a complete set of active compounds, regulates the digestive system, alkalises, energizes, detoxifies the body and acts as a functional food.

The following recipe was used to prepare the mixed green juice: 2 green apples 250g, spinach baby 150g, cucumber 250g, parsley 50g, 1/2 green lime. Samples of fruits and vegetables were purchased from a local market in May 2018.

The green juice obtained is a 100% natural product, without additives or preservatives, made with the juicer by mastication that extracts, crushes and presses, contributing to the release of nutrients from fruits and vegetables used in the preparation.

Natural juices from green plants were prepared using a Centrifugal Juicer of fruit and vegetables. Five distinct samples of apple juice, cucumber, spinach, parsley, limes of about 200 ml, were prepared separately, and a mixed sample resulting from the mixture of the 5 ingredients.

The physicochemical characteristics were determined from fresh and clearly juice prepared using a fruit and vegetable press robot. The pH was measured using a pH meter mark OP-211/2 connected with combined electrode OP-0808P according to the AOAC methods. The total soluble solids (TSS) and the refractive index were obtained using the refractometry method, with the Abbe refractometer corrected to the equivalent reading at 20°C (AOAC, 1995). Electrical conductance was determined by conductometer OK 112 and viscosity using Ostwald-type viscometer.

## Results and discussion

The purpose of this paper was to analyze and compare some physico-chemical characteristics: pH, electrical conductivity, dynamic viscosity, refractive index, in case of the juice samples obtained from apples, spinach, cucumber, parsley and lime taken separately and all in the mixture. The determination of the physico-chemical parameters (pH, G, n,  $\eta$ ) is an important indicator in the investigation of the physico-chemical and nutritional properties of the green juices analyzed in this study.

The property of plant juices to drive the electric current is quantitatively evaluated by electrical conductivity, G. Electrical conductivity is one of the parameters that verifies the authenticity, freshness of a product. The electrical conductivity of a food product is a function of product characteristics (composition, sugar content and salts, pH, etc.), and is also influenced by the heating process, especially temperature.

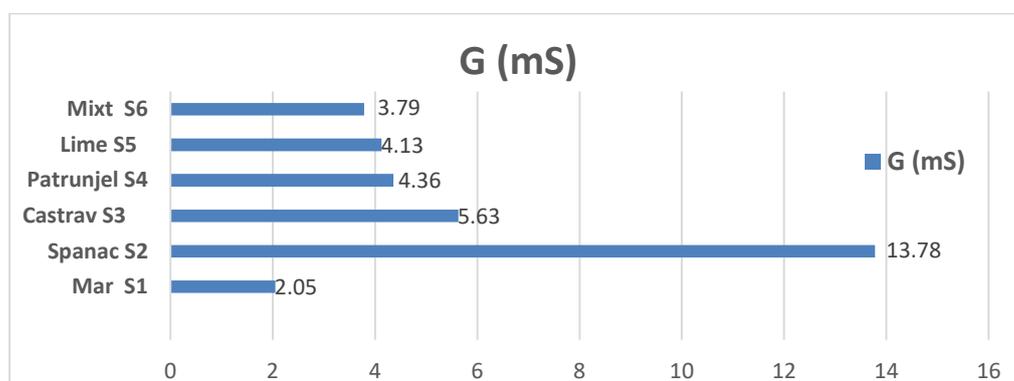


Figure 1. Determination of conductivity for different type of green juice samples

In terms of electrical conductivity, the highest value was obtained for natural spinach juice (13,78 mS) and the smallest of natural green apple juice (2,05mS). Natural juices contain a range of minerals, organic acids, fibers, salts and other bioactive substances.

Minerals are present in the form of electrolytes, so they are easily absorbable by the human body. It is known that the solution's conductivity increases with its content in dissolved substances. Conductivity varies with concentration and it grows with increasing electrolyte concentration. This increase depends both on the nature of the electrolyte and on the temperature.

Sugar (sucrose) is a carbohydrate that naturally occurs in fruits and vegetables. The high sugar concentration in fruit juices gives a high refractive index value. Regarding the refractive index, the smallest value (1.3439) was obtained in case of mixed natural juice with all ingredients and the highest value (1.3620) was obtained for the natural apple juice due to the soluble substance content, the sugar in the composition.

The acidity or alkalinity of a solution is expressed by physical size, pH. Being a measure of the acidic or basic character of a solution, pH is an important factor in the processing of fruit and vegetable products.

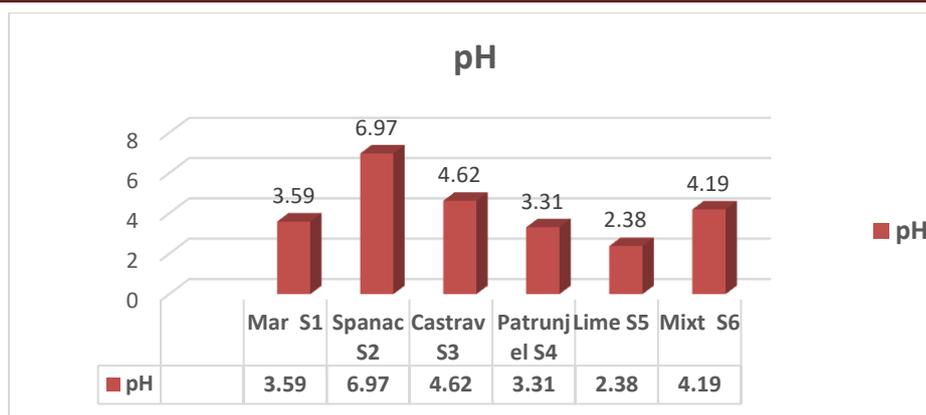


Figure 2. Determination of pH for different type of green juice samples

In case of the pH determination it was observed that the lowest value was obtained for lime juice (2.38) and the highest value for green spinach juice (6.97). Higher acidity (low pH) of preserved juices than fresh ones, recommends natural, fresh daily intake as a benefit in the treatment and prevention of many diseases. For example, most commercial drinking water has pH 7, beer has a pH of about 5, and juices between 5 and 6. Water and natural juices from fruits and vegetables have the role of compensating for a too acidic diet that can disrupt our metabolism. From the comparative analysis of pH determination results, this parameter is within the permissible limits for all the samples analyzed in this study.

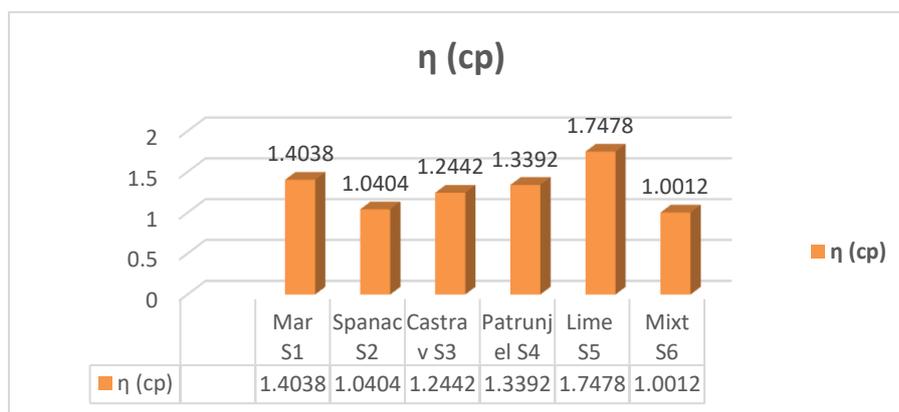


Figure 3. Determination of viscosity for different type of green juice samples

Viscosity is considered an important physical property for the quality of liquid foods. The increase in viscosity is the result of increased fiber, pectin and the amount of sugar present. If the natural herbal juices contain considerable amounts of pulp or are highly concentrated, they may have additional flow resistance represented by a higher stretching request. It has been found that the fresh juice viscosity is higher than the pasteurized ones due to the increased fiber content, pectin. For this reason, it is recommended to use freshly squeezed natural juices instead of pasteurized.

## **Conclusion**

Green herbal juices have an important status in the modern diet due to their exceptional nutritional, functional and therapeutic qualities. Juices from green vegetables and fruits are an excellent source of water, natural sugar, vitamins, minerals, antioxidants, pigments, dietary fiber and other food ingredients.

From their analysis, for the natural juices considered (apples, spinach, cucumbers, parsley, and mixed) it can be noticed that their values differ from one category to another, but results are comparable to the data from the literature.

Due to its beneficial nutritional and antioxidant qualities, it is recommended to consume daily, succulent, freshly squeezed and immediately consumed over the pasteurized. Green vegetable and fruit juices acting as a functional food, is a simple affordable and effective alternative to cellular regeneration, health human body improvement.

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