

## CHEMICAL ANALYSIS OF DIFERENT BRANDS OF ORANGE JUICE IN SERBIAN MARKET

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**Abstract:** The chemical analysis of five different brands of orange juice in the Serbian market were evaluated to determine their overall quality. Assays were evaluated for eight quantitative characters: pH value, moisture content, total solids, acidity, content of Ca<sup>2+</sup>, Mg<sup>2+</sup>, Cl<sup>-</sup> and Vitamin C at the laboratory of the Faculty of Agronomy, Čačak. The analyses were performed under the Ordinance on fruit juices and certain related products intended for human consumption ("Official Gazette of RS", No. 103/2018, 94/2019, 2/2020 - correction, 84/2020). Generally, the juice samples were within the regulatory specifications, and are fit for consumption.

**Keywords:** Orange juice, chemical analysis, vitamin C

### Introduction

Fruits have been a part of human diet over the years. They are also considered as food supplements and are recommended internationally as essential to healthy nutrition, because they contain high quantity and quality of water, sugars, vitamins and minerals (Wardlaw, 2004; Potter and Hotchkiss, 2006). One of the ways of preserving fruits from deterioration and subsequent loss is to process them into fruit juices (Wenkam, 1990; Vanamala et al., 2006).

The sweet orange (*Citrus sinensis*) is native to China with the orange tree being the most cultivated fruit tree in the world. Oranges have no particular cultivation requirements, although they prefer temperate climates such as those prevailing in the Mediterranean basin.

It is well established that citrus and citrus products are a fashionable supply of vitamins, minerals and dietary fibre (non-starch polysaccharides) that are essential for traditional growth and development and over all nutritional well-being. However, it's currently commencing to be appreciated that these and alternative biologically active, non-nutrient compounds found in citrus and alternative plants (Phytochemical) may facilitate to cut back the danger of the

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many chronic diseases. Whereas, applicable dietary pointers and suggestions that encourage the consumption of citrus fruit and their products will cause widespread nutritional edges across the population. Citrus fruits are accustomed medical sciences like it improve our immune system and digestion; brighten our skin; jumpstart our metabolism; fight infection.

The objective of the present study was to evaluate the contents of the five popular brands of orange juice in the Serbian market.

### **Materials and methods**

Five popular brands of orange juice were purchased off from different market in Serbian: Nectar family, Next joy, Life premium, Bravo and Tube. At the laboratory of the Faculty of Agronomy, volumetric methods of analysis: acid-base titration, precipitation, complexometric titration, oxidoreduction titration; and gravimetry were used for the quantitative analysis of orange juices. All samples were analyzed in triplicate. The analyses were performed under the Ordinance on fruit juices and certain related products intended for human consumption ("Official Gazette of RS", No. 103/2018, 94/2019, 2/2020 - correction, 84/2020).

### **Results and discussion**

In the present study five brands of orange juice were evaluated for eight quantitative characters: pH value, moisture content, total solids, acidity, content of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Cl}^-$  and Vitamin C.

The results obtained from the chemical analysis of the different brands of orange juice samples are presented in Table 1.

The moisture content in the different brands of orange juice analyzed ranged from 87.05 to 92.05%. Bravo orange juice has the highest moisture content, and Nectar family orange juice has the lowest moisture content. The moisture content has an inverse relationship with the total fruit juice content.

Also, the total solids content of the fruit juices were: 12.95% for Nectar family, 10.75% for Next joy, 12.24% for Life, 7.95% for Bravo and 10.86% for Tube. The total solids and juice content are used in characterizing the quality of juice and other beverage products (Egbekun and Akubor, 2007; Adubofuor et al., 2010).

The pH value of the orange juice samples range from 2.88 to 3.73. Sample Life orange juice has the highest pH value of 3.73.

Table 1. Chemical analysis of different brands of orange juice samples

Parameter	Nectar family	Next joy	Life	Bravo	Tube
pH	3.24	2.88	3.73	3.07	2.98
Moisture (%)	87.05	89.25	87.76	92.05	89.14
Total solids (%)	12.95	10.75	12.24	7.95	10.86
Acidity (g dm <sup>-3</sup> )	5.79	3.54	5.36	5.47	4.29
Ca <sup>2+</sup> (mg dm <sup>-3</sup> )	32.06	12.83	64.13	57.71	32.06
Mg <sup>2+</sup> (mg dm <sup>-3</sup> )	77.79	38.89	136.14	42.79	27.23
Cl (g dm <sup>-3</sup> )	0.32	0.17	0.35	0.28	0.16
Vitamin C (mg dm <sup>-3</sup> )	506.88	270.34	473.09	337.92	304.13

Food acids dictate the dominant microflora in foods and to a large extent will determine the shelf stability of the juice (Ezeama, 2007). The more acidic the juice, the less susceptible to bacterial action but the more susceptible to the action of yeasts and moulds (Jay, 2000). Moreover Anvoh et al. (2009) reported that fruit acids influence colour, flavour and gustative characteristics of the juice products. The obtained results show that the juice produced by the Necrat family has the highest content of malic acid, and the juice produced by Next joy has the lowest content of malic acid.

Citrus fruits are rich in organic acids, which are used as a main indicator of maturation and one of the primary analytical evaluations of flavor quality when combined with sugar content. The organic acid content of fruits is especially interesting since it has a considerable influence on the sensory aspects of fruit juices, (Kelebek and Selli, 2011). Vitamin C (ascorbic acid) is an important ingredient in the diet, but it is quickly depleted or destroyed by heat and oxygen during food processing, packing, and storage. Orange juice quality is also determined by ascorbic acids, which are powerful antioxidants (Kelebek and Selli, 2011). Since of its ease of degradation, ascorbic acid is used as a reference in several industrial processes because its presence assures that the end product has a satisfactory nutritional quality (Klimczak et al., 2007). Ascorbic acid content of fruit juices is the most prominent quality index of fruit juices due to its health significance as a vitamin and cellular antioxidant (Landon, 2007). The fruit juices will contribute on the average, 40% to the recommended dietary intake of vitamin C. Sample juice produced by the Necrat family had the highest content of vitamin C (506.88 mg dm<sup>-3</sup>).

The results show that the juice produced by Life has the highest content of chloride ions ( $0.35 \text{ g dm}^{-3}$ ), and the lowest content of chloride ions has the juice of Tube ( $0.16 \text{ g dm}^{-3}$ ).

The highest concentration of  $\text{Mg}^{2+}$  is in the sample produced by Life, and the lowest concentration is in the sample produced by Tube. The presence of  $\text{Ca}^{2+}$  is the highest in the manufacturer Life, and the lowest in the manufacturer Next joy.

All the obtained results are in accordance with the Ordinance on fruit juices and certain related products intended for human consumption ("Official Gazette of RS", No. 103/2018, 94/2019, 2/2020 - correction, 84/2020).

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### **Conclusion**

In the present study five brands of orange juice were evaluated for. The results of chemical analyzes of basic quality indicators were used. The analyzes were done at the Laboratory of the Faculty of Agronomy in Čačak. All the obtained results are in accordance with the Ordinance on fruit juices and certain related products intended for human consumption ("Official Gazette of RS", No. 103/2018, 94/2019, 2/2020 - correction, 84/2020). The difference in the quality attributes of the different brands of orange juice may be attributed to the different processing procedures employed and storage conditions. Consumption of these beverages is desirable as they would serve as good sources of vitamins and body electrolytes.

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