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LIGHT INDUSTRY AND FOOD INDUSTRY

Comparative analysis of ascorbic acid levels in fruits of major cultivated citrus species

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The consumption of fruits, especially those belonging to the Citrus L. genus, and their processed derivatives, including juices, represents a significant part of human dietary intake. The organoleptic properties of citrus fruits have ensured their cultural importance and wide global cultivation [1]. The diverse array of bioactive phytochemicals in their composition emphasizes their pharmacological value and highlights the need for continued scientific research into their properties. Citrus cultivation extends to over 140 countries worldwide [2]. The geographical origin of these plants is attributed to Southeast China and the Malay Archipelago. While Citrus sinensis (orange), Citrus reticulata (mandarin), Citrus limon (lemon), and Citrus paradisi (grapefruit) are the most widely recognized members, the genus encompasses a significantly broader range of species, varieties, and interspecific hybrids [3].

The global demand for citrus fruits has risen significantly in recent decades. This trend correlates with growing public awareness of healthy eating habits and the year-round availability of citrus products. Global annual citrus production exceeds 159 million metric tons [4], with most of the crop used for fresh consumption or juice extraction.

Citrus fruits are rich in bioactive compounds, including ascorbic acid (vitamin C), carotenoids, and flavonoids [5].

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This study aimed to determine the ascorbic acid content in freshly extracted juices from the most common citrus species consumed in Ukraine. Five randomly selected fruits of each species, phenotypically homogeneous (in terms of color, size, and density, and free from defects), were analyzed immediately after sample collection. Ascorbic acid content was quantified using iodometric titration. Sample preparation included filtration and centrifugation using standard laboratory methods. All measurements were performed in accordance with recognized metrological principles and subjected to statistical analysis. Ascorbic acid concentration is a critical indicator of citrus juice quality due to the inherent instability of this water-soluble vitamin under the influence of various external and internal factors, including cultivar, maturity stage, storage conditions, ultraviolet exposure, temperature, humidity, and pH [6]. The ascorbic acid content in the citrus samples ranged from 26.21 to 57.25 mg/100 cm³. Citrus sinensis exhibited the highest ascorbic acid concentrations, exceeding those of Citrus reticulata by a factor of two. Citrus limon demonstrated 38% higher vitamin C content compared to Citrus aurantiifolia. Citrus paradisi and Citrus sweetie showed comparable vitamin C concentrations. This observation aligns with the findings reported in [7]. A significant part of the observed variance can be attributed to the genetic diversity of citrus cultivars and their respective cultivation environments [8].

In conclusion, the ascorbic acid content exhibits significant interspecific variation among the studied citrus species, with Citrus sinensis displaying the highest concentrations. No statistically significant differences in ascorbic acid levels were detected among Citrus paradisi, Citrus limon, and Citrus sweetie.

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