



Preliminary data on physical and biochemical profile of loquat (*Eriobotrya japonica* Lindl.) harvested in Albania

Ilir Lloha^{*1}, Oneida Kyçyk², Juna Cara³

¹Agricultural University of Tirana, Department of Science and Biotechnology, Albania, illoha@ubt.edu.al

²Agricultural University of Tirana, Department of Food Research, Albania, okyçyk@ubt.edu.al

³Agricultural University of Tirana, Department of Food Science and Biotechnology, Albania, junacara1@gmail.com

Cite this study: Lloha, I., Kyçyk, O., & Cara, J. (2023). Preliminary data on physical and biochemical profile of loquat (*Eriobotrya japonica* Lindl.) harvested in Albania. *Advanced Engineering Days*, 7, 106-108

Keywords

Eriobotrya japonica
Biochemical profile
Total Flavonoid content
Total phenolic content
Vitamins content

Abstract

Eriobotrya japonica is an evergreen plant that shows high medicinal value. Till now there aren't any publication in the frame of the biochemical profile of loquat that grow in Albania. Therefore, the main aim of this study was to evaluate the total mineral content (TMC), total phenolic content (TPC), total flavonoid content (TFC), tannin content, orthodiphenols content as well as total vitamin A and C of loquat fruits that grow in Albania regions. Three types of varieties of the loquat were analysed, Sayda variety, Golden Nugget variety and Nafk Cukur Gobek variety. Based on the physical parameters, it was observed that Nafik Cukur Gobek presented the highest average values in the frame of pulp weight, moisture, dry matter and other parameters. Also, the variety Nafik Cukur Gobek contained the highest values of vitamin C, vitamin A, total flavonoids and polyphenols content as well as total tannins content. The Sayda variety shows the highest acidity value. Total orthodiphenols content was determined in the Golden Nugget variety. Regardless of the data presented in this manuscript, further studies are warranted in the near future to have a full understanding of the bioactive compounds profile in loquat fruits that grow in Albania.

Introduction

The loquat (*Eriobotrya japonica* Lindl.), an evergreen subtropical fruit tree that is a member of the Rosacea family, is a native of southeast China. Nowadays this plant is cultivated in more than 30 countries around the world, including Japan, Turkey, Brazil, India, and in the Mediterranean countries, including Albania. Loquat fruits come in two primary varieties, red and white cultivars, and the color of the fruit and edible parts varies depending on the carotenoid accumulations in each [1].

Loquat as a plant shows high medicinal value. Traditionally, loquat extracts have been used for the treatment of inflammation, diabetes, and cancer [2]. Loquats are very high in antioxidants, chemicals that help protect the cells against damage and disease. In recent years, modern scientific studies, by using different experimental models have proved the anti-inflammatory capacity of different loquat tissues such as fruit [3]. Furthermore, research has shown that loquat extracts can inhibit cell carcinogenesis at several phases of the disease's evolution, including proliferation, and metastasis [4–5].

The fruit loquat is not widely cultivated in Albania. Typically, the trees are found in the yards of private houses, in villages and are completely organic. Till now there aren't any publication in the frame of the biochemical composition of loquat that grow in Albania. There are some attempts to include these fruits in different diets prescribe from nutritionist for persons that suffer from noncommunicable disease in Albania such as diabetes, obesity etc. Therefore, the main aim of this study was to evaluate the total mineral content (TMC), total phenolic content (TPC), total flavonoid content, tannin content, orthodiphenols content as well as total vitamin A and C of loquat fruits that grow in Albania regions.

Material and Method

Three types of varieties of the loquat (*Eriobotrya japonica* Lindl.) were analysed:

- Sayda variety. Samples were harvested in Ndroq region.
- Golden Nugget variety. Samples were harvested in Berat region.
- Nafk Cukur Gobek variety. Samples were harvested in southern Albania region.

All the samples were harvested from April to May 2022 and during transportation, samples were kept on ice and then were stored at 4°C at the Laboratory of Food Analyses, Faculty of Biotechnology and Food. Prior to the determination of bioactive compounds in loquat fruits, physical characteristics such as dimension, weight, color etc. were determined. The pulp and core of the loquat fruit were divided, weighed, and an average of the total weight of pulp and core were calculated. The acidity of fruit juice was determined, based on AOAC method, by simple direct titration with 0.1M sodium hydroxide, using phenolphthalein as an indicator. Total phenolic content (TPC) was calculated [6] using Folin-Ciocalteu method. The total flavonoids content was determined through the aluminum trichloride method using quercetin as a reference standard [7]. Total vitamin A determination was based on spectrophotometric methods [8]. A rapid and practical method for the total vitamin C content determination was used based on the iodine titration method.

Results

The following results belong to three varieties of loquat fruits. In “Table 1” are presented all the physical characteristic of loquat fruits such as grain weight, seed weight for which the variety of 'Nafik Cukur Gobek' presented the highest average values.



Figure 1. Measurement of physical characteristics of loquat varieties that grow in Albania

The highest mineral content, which was determined as a percentage of ash, was observed in the 'Golden Nugget' variety. From the obtained results it was observed that: cultivar 'Golden Nugget' presented higher moisture values, while cultivar 'Nafik Cukur Gobek' presented higher average values in the percentage of dry matter and cultivar "Sayda" shows the highest average value for total soluble solids (TSS).

Table 1. Physical parameters of *Eriobotrya japonica* varieties express as mean value

Varieties of <i>Eriobotrya japonica</i>	Pulp weight (g)	Core weight (g)	Moisture (%)	Dry matter (%)	TSS Brix	Ash
Sayda	22.42	15.31	87.4	13.49	11.2	0.7 %
Golden Nugget	19.96	21.62	89.5	10.36	9.1	0.6 %
Nafik Cukur Gobek	64.32	36.67	87.4	11.63	10.3	1.2 %

Table 2. Index of Loquat varieties fruits. The values of total acidity, vitamin C, vitamin A, TFC, TPC, TTC and TOC are expressed as means

Fruit index	Sayda	Nafik Cukur Gobek	Golden Nugget
Acidity (g/L)	0.876	0.232	0.193
Vitamin C (mg/L)	1.125	1.25	1.25
Vitamin A (µg/mol)	3.53	4.25	1.56
Total Flavonoid Content (TFC mg/L)	30.23	43.86	7.81
Total Polyphenolic Content (TPC mg/L)	349.33	434.16	219.52
Total Tannin Content (TTC mg/L)	10.17	18.90	6.71
Total Orthodiphenol Content (TOC mg/L)	52.12	22.61	59.41

Based on the study, the Sayda variety was the one with the highest acidity. Vitamin C was more present and in higher quantity in Nafik Cukur Gobek and Golden Nugget varieties. In addition to the physical parameters, it was

seen that the variety Nafik Cukur Gobek contained the highest values of total vitamin C, total vitamin A, total flavonoids contents, total polyphenols content, and total tannins content. Orthodiphenols were more present in the Golden Nugget variety. All the data extracted from the fruits of the three loquat varieties for the bioactive compound's presence, express as an average value of samples juice analyse in triplicate, are presented in Table 2.

Discussion

Due to their physical properties, such as color, texture, and flavor, as well as the significant availability of bioactive components including polyphenols, anthocyanins, and dietary fiber, consumers are seeking out and oriented toward consuming more fresh fruits and vegetables [9]. In addition to the fact that this fruit has a long heritage because its fruits have been used as treatments for diabetes, chronic lung diseases, cancer, etc., numerous scientific research on loquat are currently very encouraging in terms of the properties listed above [9]. To the best of our knowledge, this is the first report indicating the bioactive compound profile of three varieties of loquat specie that grow in Albania. The data included in this report indicate a high presence of TFC, TPC, TTC, vitamin C and A in loquat varieties. Regardless of the data presented in this manuscript, further studies are warranted in the near future to have a full understanding of the bioactive compounds profile in loquat fruits that grow in Albania.

Conclusion

The loquat cultivars we examined showed great variability in terms of their fruit commercial quality and major bioactive compound content and therefore antioxidant activities. Despite the fact that this is an ongoing study, the data presented in the manuscript show a great potential not only to include this fruit in healthy diet in the frame of preventing noncommunicable diseases but also will pave the way for additional studies to be conducted in loquat tree tissues.

References

1. Zhou, C. H., Xu, C. J., Sun, C. D., Li, X., & Chen, K. S. (2007). Carotenoids in white- and red-fleshed loquat fruits. *Journal of Agricultural and Food Chemistry*, 55, 7822–7830.
2. Liu, Y., Zhang, W., Xu, C., & Li, X. (2016). Biological Activities of Extracts from Loquat (*Eriobotrya japonica* Lindl.): A Review. *Int J Mol Sci*, 17(12), 1983. <https://doi.org/10.3390/ijms17121983>.
3. Lin, J. Y., & Tang, C. Y. (2008). Strawberry, loquat, mulberry, and bitter melon juices exhibit prophylactic effects on LPS-induced inflammation using murine peritoneal macrophages. *Food Chemistry*, 107, 1587–1596.
4. Komiya, T., Achiwa, Y., Katsuzaki, H., Imai, K., Sakurai, S., Urakawa, K., Ohnishi, K., Adachi, T., Yamada, T., & Hibasami, H. (1998). Effect of oleanolic and ursolic acids isolated from Loquat (*Eriobotrya*) on the growth of human lymphoid leukemia cells. *Food Science and Technology International*, 4, 282–284.
5. Ito, H., Kobayashi, E., Takamatsu, Y., Li, S. H., Hatano, T., Sakagami, H., Kusama, K., Satoh, K., Sugita, D., Shimura, S., Itoh, Y., & Yoshida, T. (2000). Polyphenols from *Eriobotrya japonica* and their cytotoxicity against human oral tumor cell lines. *Chemical & pharmaceutical bulletin*, 48(5), 687–693. <https://doi.org/10.1248/cpb.48.687>
6. Elfalleh, W., Hannachi, H., Tlili, N., Yahia, Y., Nasri, N., & Ferchichi, A. (2012). Total phenolic contents and antioxidant activities of pomegranate peel, seed, leaf and flower. *Journal of Medicinal Plant Research*, 6, 4724e30.
7. Zhishen, J., Mengcheng, T., & Jianming, W. (1999). The determination of flavonoid contents in mulberry and their scavenging effects on superoxide radicals. *Food Chemistry*, 64, 555–559.
8. Rutkowski, M., & Grzegorzczak, K. (2007). Modifications of spectrophotometric methods for antioxidative vitamins determination convenient in analytic practice, *Acta Scientiarum Polonorum, Technologia Alimentaria*, 6(3), 17–28.
9. Costa, B. P., Ikeda, M., de Melo, A. M., Bambirra Alves, F. E. S., Carpiné, D., & Ribani, R. H. (2022). *Eriobotrya japonica* fruits and its by-products: A promising fruit with bioactive profile and trends in the food application—A bibliometric review. *Food Bioscience*, 50, 102099.