



## Volatile compounds and antioxidant activity of *Rosa canina* L., biotypes from spontaneous flora of Albania

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### Keywords

Rosehip fruits  
Ascorbic acid  
Total Polyphenols  
Flavonoids  
Natural antioxidants

### Abstract

It is reported that the *Rosa canina* L. fruit, with its high ascorbic acid, phenolics and flavonoids contents, have antioxidant, antimutagenic and anticarcinogenic effects. The aim of this study was to evaluate the content of polyphenols, vitamin C and antimicrobial and anti-inflammatory compounds. Volatile compounds of wild rose fruit were extracted by the SCFE-CO<sub>2</sub> following the method (ISO121.2007E). The composition of the botanical extract was analyzed with 436-GC FID detector (Scion Instrument) in accordance with the standard (ISO 1124/1; 1124/2). The main groups of organic compounds identified by GC in the samples taken for analysis were Alkanes/Alkenes (76.5% ± 2.4), Alcohols (10.6% ± 2), Monoterpene (6.3% ± 1.3), Sesquiterpene/ oxygenated sesquiterpene (1.47% ± 0.6), Eugenol (5.03% ± 0.28). The content of polyphenols varies from 53-248 mg GAE / 100 gr per sample, the content of vitamin C from 545-1756 mg. Ascorbic acid/100 gr of sample. Most of the potential of medicinal plants in Albania are found as a part of spontaneous flora, which makes the quality of medicinal or aromatic plat values they contain to be higher compared to other areas in the region.

### Introduction

In the Albanian economy Medicinal & Aromatic Plants (MAPs) hold a very special place. In the communist era, exports of MAPs earned close to \$50 million [1]. High potential of medicinal and aromatic plants that grow spontaneously are a natural asset for which there is a high demand in the international market [2]. *Rosa canina* L. (Rosehip fruit) is a shrub of the Family *Rosaceae*, native to Europe, Western Asia, and northeastern Africa. At the wider contexts this species expresses an extremely high biological diversity, as no more than 200 biotypes, forms and hybrids have been identified. Nutritional and therapeutic value of wild rose, respectively ripe fruit (FructusCynosbati) in their content include sugars, organic acids, pectins, flavonoids, tannins, carotenoids (β-carotene, lycopene, and isomers of rubixanthin (especially). vitamin C, but also vitamins B1, B2, K, PP, D, and E), macro and microelements [3, 4, 5]. The seeds of the wild rose plant contain oils and minerals; fatty acids in the content of oils that are mainly represented by linoleic, oleic, linolenic, palmitic, stearic, and arachinodic acid [6]. Fruit content analysis further confirms the presence of vitamin components, antiscorbutic, astringent, collagen, diuretic, antidiarrheal, antioxidant, anti-inflammatory, even anti-mutagenic; they also increase collagen biosynthesis, stimulate the immune system, improve the body's resistance [3, 4]. Some properties of wild rose fruit have been attributed to some hypothetical silicon compounds. At the same time, wild rose is useful to prevent soil erosion, especially in the case of our country when the levels of abandonment of agricultural lands are pronounced. Nutritional, therapeutic and ecological value of the wild rose plant do these plants to have a very good perspective in the situation of opportunities to be cultivated at least in regions with degraded lands, which in terms of abandonment of rural and hilly and mountainous areas are numerous. In this view, some forms

of wild rose are distinguished for their productivity and fruits quality. This is one of the reasons for undertaking this study.

## Material and Method

Raw material or plant material consists of dried fruits that have reached a good ripeness and have been collected in different areas of Albania, and respectively: Skrapar, Korce, Tropoje, and in also obtained occasionally from different markets. The dried fruits are pre-pressed and ground in a blender until they have reached a smaller particle size of 2 mm, to be further subjected to extraction procedures.

### Determination of total polyphenols

5 g of dried and ground sample was treated with solvent (water: methanol; in a ratio of 4: 1) and then centrifuged for 15 minutes at 3000 rpm. The supernatant was used for further analysis of total polyphenols. The concentration of total polyphenols in the extracts was determined according to [7] with the help of the Specord 40 spectrophotometer (Analytic Jena) based on the colorimetric oxidation-reduction reaction according to the Folin-Ciocalteu method following the extraction procedure. Folin-Ciocalteu reagent has been used as the oxidizing agent. 500  $\mu$ l of sample extract was treated with 1 ml of 96% Ethanol, 5 ml of distilled water and 0.5 ml of Folin-Ciocalteu reagent. The mixture is homogenized in the vortex for 30 seconds and then 1 ml of Na<sub>2</sub>CO<sub>3</sub> solution (20% v/v) is added. The samples were incubated for 30 minutes. The absorbance measurement was performed at 760 nm. The amount of total phenols is expressed in mg Gallic acid equivalent per 100 grams of dry matter (mg GAE/100 mg dry matter). The calibration curve was constructed using pure Gallic acid with concentrations of 20 - 80  $\mu$ g GAE.

### Determination of vitamin C (Ascorbic Acid)

The concentration of vitamin C in wild rose extract was determined by redox titration with standard 0.01N Iodine solution (Sigma) using 1% starch solution as an indicator. In the analysis, 2.5 grams of each sample were taken after grinding. The amount is placed in a beaker with a volume of 250ml to which is added about 100-150 ml of distilled water. The mixture is allowed to extract in the cold with the aid of a horizontal shaker for about 2 hours. The mixture was rapidly titrated with 0.01N iodine solution in the presence of 2ml of 1% starch until blue. The titration is performed quickly so as not to affect other substances such as cysteine and glutathione, which are slowly oxidized by Iodine. The calculation of the amount of ascorbic acid is performed per 100 g of dry weight sample knowing that for every 1 ml of solution 0.01N Iodine consumed is equivalent to 0.88 mg of ascorbic acid.

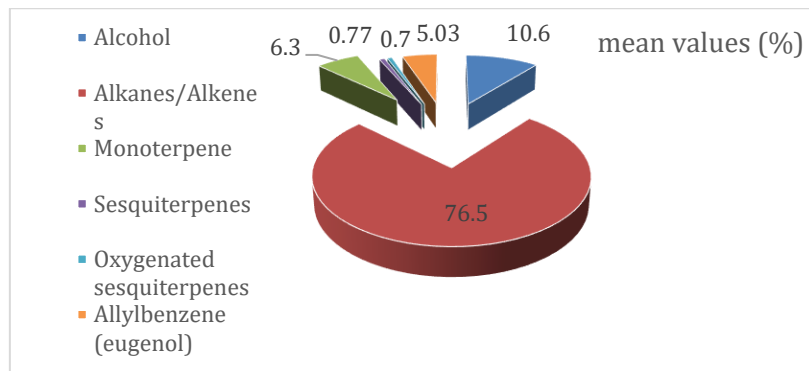
### Chromatographic analysis

The botanical extract was obtained by extraction with super critical fluid with CO<sub>2</sub> (SCFE CO<sub>2</sub>) and further analyzed for the composition of volatile compounds by chromatograph model 436-GC, flame ionization detector (FID) by Scion Instrument, nonpolar-low polar column (60m x 0.32 mm, 0.1 $\mu$ mdf). Injection temperature 180°C, oven temperature 70°C, detection temperature 280°C, carrier gas flow 1ml/min, volume of injected extract 2  $\mu$ l.

## Results

**Table 1.** Content of VitaminC and total polyphenols

Sample	Skrapari	Prespa 1	Prespa 2	Tropoja	Random sample
<b>mg Acid askorbik/100 gr sample</b>	792	545	1756	1076	1084
<b>mg GAE/100 gr sample</b>	248	93	201	85	53



**Figure 1.** The main groups of compounds identified in SCFE-CO<sub>2</sub> extract of wild rose fruit

## Discussion

The results show major differences in the content of active compounds coming from different areas of our country, such as the content of vitamin C and total polyphenols. The level of vitamin C content in the dried fruits of wild rose varies following biotopes, altitude, depending on the geographical area of their origin, with higher values at higher altitudes. Differences have been observed not only between different areas but also within the same area. The results show that there are similarities with the values of other studies [8, 9, 10]. In our extracts were identified about 24 organic compounds of the group's Alkanes/alkenes (76.5% ± 2.4), alcohols (10.6% ± 2), Monoterpene (6.3% ± 1.3), Sesquiterpene /oxygenatedSesquiterpene (1.47% ± 0.6), data which are consistent with other studies. Undoubtedly the study and investigation of the role of climatic factors on the active ingredients of medicinal plants is necessary to look at the interdependence [11]. The most important environmental factors that have a major effect on the quality and quantity of active ingredients are light, temperature, precipitation, day length, latitude, soil characteristics, altitude and nutrition [12]. The role and impact of each of them on the growth, development and active ingredients of medicinal plants should be emphasized. From our study it is noticed that the amount of vitamin C varies from 545 in Tropoja to 1756 mg / 100 grams in Prespa. The amount of polyphenols in different areas of our country varies from 53 to 248 mg of Gallic acid per 100 grams of dry matter in the Skrapar area.

## Conclusion

Our survey confirms the high values of the content of polyphenols and vitamin C, antimicrobial and anti-inflammatory compounds in different samples. Based on our data, it is concluded that climatic conditions have a significant impact on plant development and the content of active substances. Undoubtedly the study and investigation of the role of climatic factors on the active ingredients of medicinal plants is necessary to look at the interrelationship.

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