Study on the Ascorbic Acid Content of rose Hip fruit Depending on Stationary Conditions

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Abstract
The dog rose area includes southern and central Europe, reaching southern Scandinavia; it is also found in Asia Minor, Central Asia and North Africa. In our country, *Rosa canina* is the most widespread of the many species of *Rosa*, common in all areas. The components of the station, known also as the „stationary factors" affect differently the plant life and their chemical composition. *Cynosbati fructus* is the false fruit of *Rosa canina L. (Rosaceae)*, known in Romanian as rose hip. The rose hip contain as active ingredients 500-1000 % vitamin C, 600-10000 mg% carotenoids, pectin, dextrin, vitamins B2, E, PP, flavone, sugars, organic acids, tannins, volatile oil, vanillin, triterpenoid saponosides, beta-sitosterol, fat (lecithin, glycerides of fatty acids in seeds), minerals (potassium, calcium, magnesium, iron). Vitamin C (ascorbic acid) plays an important role in human body. The greatest amount is found in plants which reached maturity. It is concentrated in the rose hip flesh. Solutions easily destroyit in the presence of UV, of copper, silver, iron and oxidative enzymes traces. Vitamin C participates actively in all processes of oxidoreductions of the living cell. Its lack in food causes the disease called scurvy which manifests itself by inflammated and bleeding gums, tooth loss. Rose hip fruits are known as medicines since prehistoric times.

Keywords: ascorbic acid, chemical composition, rose hip, spreading area, stationary factors.

1. Introduction

In our country, *Rosa canina* is the most widespread of the many species of *Rosa*, common in all areas [1]. Pharmacodynamics experimenting of the active principles of plants it became possible to explain their therapeutic effect and to demonstrate clearly that the healing action of medicinal plants is not due to some of their supernatural properties but to the chemicals they contain [2]. Following this guidance there have been made many thorough inquiries in search of the active principles from plants, but only in 1756 extracted the Swedish pharmacist Scheele crystallized substances from plants, such as malic acid, citric acid, oxalic acid, thereby founding a true scientific research in phytochemistry and the active principles from plants [3]. Since then phytochemistry has known a huge development in the sense that many herbal
substances were found and isolated, findings that go on to the present day. Vitamin C (ascorbic acid) plays an important role in human body. The greatest amount is found in plants which reached maturity. It is concentrated in the rose hip flesh. Solutions easily destroyit in the presence of UV, of copper, silver, iron and oxidative enzymes traces [4]. Vitamin C participates actively in all processes of oxidoreductions of the living cell. Its lack in food causes the disease called scurvy which manifests itself by inflammated and bleeding gums, tooth loss. Rose hip fruits are known as medicines since prehistoric times [5].

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2. Materials and methods

Cynosbati fuctus is analyzed, consisting of mature rose hip (false fruit) dried, harvested from the dog rose, Rosa canina L. (Rosaceae) out of spontaneous flora.

a.Field work methods

Choosing the experimental surface

The variation study on the pharmacologically useful substances within the fruits of Rosa canina fruits will carried out by analyzing the fruits which have been harvested from a series of harvest points including the following route: Suceava - Pătrăuţi - Lunca Suceavei (Dărmăneşti) - Părhăuţi - Todireşti - Soloneţ - Cajvana - Arbore – Solca - Clit - Marginea - Rădăuţi - Sucevița - Palma. The route contains 14 stations, in each of them being analyzed and labeled three study biotypes. The general characterization of the types of stations included in the experiment: geomorphological framing and characterization (terrain units and landform, altitude, position within the terrain, geographical position) observations and interpretations on the soil. Observations were made when marking the stations and at field observations made in order to elaborate the green sheet of the species.

b. **The laboratory working method**

Determining the total content of vitamin C (ascorbic acid and dehydroascorbic acid).

The method principle

Vitamin C reduces the 2-6-diclorfenolindofenol dye in acid solution. In the absence of other reducing substances, the standard solution of 2-6-diclorfenolindofenol is reduced by vitamin C proportional with its content in the sample. Reducing substances with characteristics similar to the ascorbic acid, generically known as reductones, are determined separately and the resulted values are subtracted from the values obtained for vitamin C.

Apparatus and reagents

-spectrophotometer or photocolorimeter; 2% solution of metaphosphoric acid; buffer solution of sodium acetate with pH = 4; 0.1n solution of sodium thiosulfate; m solution of sodium sulfide; m solution of mercuric chloride; sodium bicarbonate; indophenolic dye 0.001n 50 mg solution sodium salt of 2-6diclorphenolindophenol are introduced in an Erlenmeyer flask with 30-50 cm^3 distilled water; it is slightly heated and obtained colored liquid is filtered by settling on filter paper in a 200 cm^3 volumetric flask; over the residue from the Erlenmeyer flask is added a new portion of distilled water, it is heated and the fluid is filtered in the same volumetric flask. The process of adding water, heating and filtering is repeated until complete dissolution of the dye. The content of the volumetric flask is cooled, 42 mg of sodium bicarbonate are added, it is shaken and after the complete dissolution of the sodium bicarbonate, it is brought to the sign with distilled water. The solution is kept in the dark at a temperature of 0.5 – 5^oC in amber glass, max. 15 days. The titer of the indophenolic dye solution is set before each determination as follows: 5 cm^3 solution of ascorbic acid is pipetted in 50 cm^3 Erlenmeyer flask, an equal volume of buffer solution of sodium acetate is added in order to bring the pH to 3.6-3.8 and it is titrated with indophenolic dye solution to weak pink color that persists for 15 seconds. The titer of the indophenolic dye is expressed in mg ascorbic acid, which reduces a 1 cm^3 solution of 2-6-dichlorophenolindophenol and it is given by the formula: T = c/V, where: c - the amount of ascorbic acid in 5 m^3 of standard solution, in mg; V–the volume of the solution of 2-diclorphenolindophenol used in titration, in cm^3.

1% solution of copper sulfate; Xylene with distillation range of 137-141^oC; Acetone; Doubly distilled water.

Sample preparation for analysis

In the case of solid and inhomogeneous products, 10-25 g (inversely proportional with the vitamin C content of the product) of the sample are weighted with a precision of 0.01 g. The weighed amount of sample is placed in a mortar, 20 cm3 of metaphosphoric acid, 2% solution is added and it is broken up as quickly as possible, after which it is poured in a 100 cm3 graduated cylinder with a ground glass joint.

Manner of working

In a 10 cm3 graduated cylinder it is pipetted 2-5 cm3 extract acid, it is added distilled water in order to complete the volume of 5 cm3, 1.3-1.4 cm3 sulfuric acid, 0.7 cm3 sodium sulfide solution is mixed up and let stand for 10-15 minutes. Then it is added 1 cm3 solution of mercuric chloride, it is filled up until the sign with distilled water, it is homogenized and filtered. It is pipetted 2-5 cm3 (V4) in a 50 cm3 Erlenmeyer flask, an equal volume of buffer solution is added and it is filtered with indophenol dye solution.

Calculation:
Vitamin C = (V1 - V2) T V3 1oo/V4 m, mg/100g
Vitamin C = (V1 - V2) T V3 1oo/V4 V, mg/100g
Where:V1 – the volume of the of 2-6-diclorphenolindophenol solution used for direct titration of the amount of ascorbic acid and dehydroascorbic acid, in cm3 ;V2 – the volume of 2-6-diclorphenolindophenol solution used in reductones titration, in cm3;T – the titer of the 2-6-diclorphenolindophenol solution, in mg/l;V3 – the volume at which the amount of analyzed sample was diluted, in cm3;V4 – the volume of extract acid that was taken for titration, in cm3, after the reduction with Na2S;m – the quantity of analyzed product, g;V – the volume of analyzed product, in cm3.

3. Results and discussion

The dog rose prefers the slopes with sunny exposure (S, SE, and SW) because they receive more radiation than those with northern exposure. The higher the altitude and the slope are, the more pronounced are the effects of the exposure [6]. Rosa canina agrees well any type of soil, beginning from soils that are generally medium-textured soils and low-framed content, to alluvial, wet and stuffy soils from the plains [7]. The studied stationary conditions are presented in Table 1.Vitamin C (ascorbic acid) or antiscorbutic vitamin plays an important role in human body. The greatest amount is found in plants that reached maturity [8].Vitamin C is concentrated in the hip flesh. Ascorbic acid content in Rosa canina fruits is given in Table 2.

Table 1. The studied stationary conditions

Station nomber	Geomorphology			Altitudem	Average temperatureºC		Exposure	Type of soil
	plateau	hill	mountain		spring	summer		
S1 Suceava		✓		385	10.6	17.9	SE	silty-clay
S2 Pătrăuţi		✓		370	10.6	17.9	SE	silty-clay
S3 Lunca Sucevei	✓			330	10.6	17.9	SV	alluvial
S4 Costâna	✓			330	10	17	SV	clay
S5 Părhăuţi	✓			350	10	17	S	sandy-clay
S6 Todireşti	✓			360	10	17	S	clay
S7 Cajvana		✓		384	10	17	SE	sandy-clay
S8 Arbore		✓		400	10	17	SE	clay
S9 Solca		✓		522	9	16	S	sandy-clay
S10 Clit	✓			400	10	17	SV	clay
S11 Marginea	✓			450	9	16	S	silty
S12 Rădăuţi	✓			360	10	17	SE	silty-clay
S13 Suceviţa		✓		550	8	16	SV	silty-clay
S14 Palma			✓	1200	5.7	14	SV	luvisoil

Table 2. The content variation of ascorbic acid in *Cynosbati fructus*

Station number	Content of ascorbic acid (mg/100g)			
	2007	2008	2009	2010
S1 Suceava	459.35	484.89	486.52	491.70
S2 Pătrăuţi	403.66	579.04	533.21	543.17
S3 Lunca Sucevei	544.08	591.36	568.30	571.06
S4 Costâna	388.60	472.48	462.10	466.28
S5 Pârhăuţi	391.60	577.10	579.02	573.19
S6 Todireşti	443.76	538.40	522.41	541.20
S7 Cajvana	374.12	493.07	482.80	477.82
S8 Arbore	488.54	504.66	510.63	517.91
S9 Solca	378.23	542.80	566.30	563.68
S10 Clit	404.50	584.28	591.71	588.32
S11 Marginea	512.60	621.31	573.91	581.27
S12 Rădăuţi	436.48	522.04	563.78	603.39
S13 Sucevița	494.05	499.00	502.14	509.61
S14 Palma	536.36	567.41	588.23	592.87
Average	446.85	541.27	533.64	537.96

4. Conclusions

Ascorbic acid content varies with altitude, type of soil, humidity (high humidity causes increased levels of ascorbic acid in fruit), the recorded values vary between 347.12 and 621.31 mg/100g product. An important factor in influencing the ascorbic acid content is the degree of ripeness and thus the harvest period that according to the obtained data is in early September. The rose hip fruit was harvested in 2007 in the second half of October, reflected in reduced ascorbic acid content compared to other years when it was harvested in September.

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