Studia Universitatis "Vasile Goldiş", Seria Ştiinţele Vieţii
Vol. 27 issue 3, 2017, pp 179-183

PORTULACA OLERACEA L. – SOURCE OF ORGANIC SILICON IN BODY CARE COSMETICS

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ABSTRACT: In this paper, a study was conducted on the influence of soil and extraction solvent on the active ingredient content of extracts from fat grass - *Portulaca Oleracea L* - indigenous species, in this case especially the content in organic silicon - element of great importance in the antioxidant, anti-wrinkle, repairing, moisturizing and emollient properties of cosmetic products containing active ingredients of natural plant rich in it.

For the study, both fresh and dry plants were used, which was shredded and selected as superior in terms of qualitative and quantitative composition the extract of *Portulaca Oleracea L* (dry) in Glycerin 20%, with significant content in organic silicon. To determine the organic silicon content, the atomic absorption spectrometry (AAS) method from the 9th European Pharmacopoeia, the current edition was used. Pharmacotoxicological studies performed on cosmetics with this active ingredient confirmed the safety of application to the human body.

The results obtained from the physico-chemical, microbiological and biological complex study show that the activity of capitalizing on the plant called "Fat Grass" as an organic silicon source can become a profitable, economically beneficial activity, but especially from the point of view of cosmetic effects.

Keywords: *Portulaca oleracea L., organic silicon, indigenous, cosmetics*

INTRODUCTION:

Organic silicon is considered the mineral of life and its effects on the body are almost miraculous, this mineral is one of the most effective remedies for regeneration and rejuvenation. For a long time, the role of organic silicon in the body have been known. Organic silicon, however, was recently placed after some research, the category of the most important minerals for the body. This mineral helps build bones, teeth, cartilage, tendons, hair and ensures strong future. It also stimulates cell metabolism and cell formation, prevents aging of the tissue, vascular walls and gives softness to the skin elasticity.

Silicon is known that the binding agent of the four macromolecules that make up the connective tissue of the skin. It is an essential element in the structure of three-dimensional space of the skin, providing it with mechanical properties.

The presence of silicon in the body has a stimulating action helps restore skin, improves skin elasticity, acts on the synthesis of elastin and collagen.

Connective tissues such as the dermis, are characterized by the presence of an important extracellular matrix consisting predominantly of proteoglycans and glycosaminoglycans, collagen, elastin and structural glycoproteins. These elements are organized so as to form a three-dimensional mesh that gives the mechanical properties for this type of tissue.

Organic silicon involved in the formation of collagen and is important for healthy nails, skin and hair, being used increasingly more in producing cosmetics for stimulating and strengthening the hair, strengthen and improve the appearance of nails, accelerating the growth rate of their, beautify and rejuvenate the skin.

The organic silicon combat wrinkles, stretch marks, improves nature of the skin, scalp and stimulates the pilosebaceous unit, reducing the amount of seborrhoea.

Keep the water balance of the scalp, the scalp microcirculation improved, thereby preventing hair loss. The level of

this mineral in the body decreases with age.

Therefore, the elderly need a higher intake of organic silicon, the young girl. It is found, fortunately, in most vegetables and fruits, and deficiencies are rare.

However, organic silicon content from these sources is not enough to supply the recommended

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daily intake. [In- Young Kim et al.,2013; Grieve, 1998]

Based on the literature presented above, it requires the use of organic silicon from natural sources for the production of body care products comet to provide a daily amount of organic silicon required for normal body.

This paper has sought to highlight the 12 organic silicon products of natural origin of which 5 vegetable products, one product of the hive and 6 extracts in glycerol 20%, obtained by cold maceration.

Natural products studied were:
- chokeberry - dried fruit *(Aronia melanocarpa),*
- bird cherry - dried fruit *(Prunus padus),*
- energetic willow - dried young branches *(Salix viminalis),*
- bee bread (honey or pollen used as food by bees. This so-called bee bread is used later by the young bees to make pap, bee milk or jelly for the larvae),
- einkorn wheat - dried aerial parts *(Triticum monococcum)* and
- fat grass - dried aerial parts *(Portulaca oleracea,),*

respectively extracts in glycerol 20% from*:*
- chokeberry - dried fruit *(Aronia melanocarpa),*
- bird cherry - dried fruit *(Prunus padus),*
- energetic willow - dried young branches *(Salix viminalis),*
- bee bread,
- einkorn wheat - dried aerial parts *(Triticum monococcum)* and
- fat grass - dried aerial parts *(Portulaca oleracea).*

The fruits of chokeberry contain anthocyanins, tannins, vitamins C, E, organic acids, trace elements, carotenoids, sugars. Chokeberry contain 15 times more antioxidants than blueberries. [Aliona Ghendov-Mosanu et al., 2012]

Bird cherry fruits contain tannins, mineral, which hydrolyze glycosides, amygdalin prulaurasin and the intestinal tract hydrocyanic acid and benzaldehyde. [N. D Sargison. Et al., 1996]

Young energy willow branches *(Salix viminalis)* contains salicin, which splits the body into glucose and saligenin or salicylic alcohol, the nature of the catechins tannins, resins, and other components or flavone heterosides nature. [Meikle, R. D., 1984]

Bee Bread contains carbohydrates (sugars) ~ 35%, 1-6% fat, carotenoids (provitamin A between 200-875 mg /

kg, vitamin E ~ 1.7 g / kg vitamin C between 6-200 mg / 100g of product. [Denisow Bozena et al., 1996]

Wild wheat aerial parts of red *(Prunus padus*) contain proteins, carbohydrates, lipids, vitamins, minerals, amino acids, enzymes. [Bonjean,A.P. et al., 2001]

Fat grass *(Portula Oleracea)* plenty of nutrients such as vitamins, minerals, fatty acids, especially omega -3 acids, glutamic acid, aspartic acid, glutathione, mucilage, citric acid, malic acid, coumarins, flavonoids, alkaloids, saponins. [Cowper, A, 1996; Leung, A.Y., 1996; Sakai, N et al., 1996]

MATERIALS AND METHODS:

The products under study were analyzed by flame atomic absorption spectrometry (FAAS), which is based on the measurement of radiant power adsorbed by a population of free atoms, in compliance with the European Pharmacopoeia 9th edition, the current edition. [Europeean Pharmacopoeia, Edition 9.0, 2016.]

Preparation of extracts

Extracts in glycerin R 20% were obtained from each of crop taken into working, and the product dried hive by cold maceration in a ratio of 1: 5 at room temperature for 7 days.

After maceration, they were filtered by suction filter.

The extracts obtained after filtration was used to determine the silicon content.

Samples preparation

Weigh 0,5g of the sample in a platinum crucible and calcined at a temperature of 600o ± 25 0 C for four hours.

It takes 2-3 mL quantitative residue hydrofluoric acid R and transfer quantitatively to a 50mL volumetric flask. Fill up to the mark, the volumetric flask with water R by repeated washing of the crucible.

The silicon concentration was determined in each sample to be analyzed by direct reading from the calibration curve

established under the same conditions in parallel to the wave length λ = 251.6 nm.

Reagents and materials
- hydrofluoric acid R;
- water R;
- stock solution of silicon 1000mg/L
- standard solutions of silicon in the range of 10-200 ppm concentration obtained by diluting stock solution of 1000 mg / L of water R

All reagents were ultrapure grade.

Preparation of standard solutions used for ultrapure water obtained with the device Milli-Q Direct 8 (Merck

Millipore).

The calibration curve is linear silicon concentrations in the range of 10-200ppm.

Standard solutions were prepared from stock solutions with the concentration of silicon de1000mg / L (Merck).

Equipment

Weighing samples was performed with analytical balance Kern 770 GS/GJ (Manufacturer: Kern &

Sohn GmbH, Germany)

Calcination was performed using a furnace Nabertherm (Manufacturer: Nabertherm, Germany)

The measurements were carried out using the atomic absorption spectrophotometer equipped with a double beam flame atomizer (flame air-acetylene), the deuterium lamp for background correction and hollow cathode lamps for the organic silicon AVANTA GBC (GBC explorations Equipment Pty Ltd, Australia).

Working technique

Determine the absorbances of the reference solutions and the test solution.

The absorbance value of the reference solution is automatically lowered from the value obtained at the test solution.

Record the values obtained for the metal concentration.

Calculation:

$$M, ppm = \frac{C \times V}{m_p},$$

a)

in which:

C = the metal concentration read on the apparatus, in µg / mL, (ppm); V = volume of the test flask used to prepare the test solution, in mL; Mp = mass of sample to be analyzed in g;

M = the analyzed metal, in µg / mL, (ppm).

$$M\,(\%) = \frac{C \times V}{m_p \times 10^4},$$

b)

in which:

C = the metal concentration read on the apparatus, in µg / mL, (ppm); V = volume of the test flask used to prepare the test solution, in mL; Mp = mass of sample to be analyzed in g;

M = the analyzed metal, in percent;

10^4 = correlation factor.

c*)*

$$MI(\text{mg/ tablet or mg/ capsule}) = \frac{C \times V \times M2}{mp \times 10^3},$$

in which:

C = the metal concentration read on the apparatus, in µg / mL, (ppm); V = volume of the test flask used to prepare the test solution, in mL; Mp = mass of sample to be analyzed in g;

M1 = the metal analyzed, (mg / compress or mg / capsule);

10^3 = correlation factor.

M2 = mean mass of the tablet or capsule, g.

RESULTS AND DISCUSSION:

Five plant products and one hive product were studied, namely:

- Aronia-dried fruits *(Aronia melanocarpa),*
- marrow - dried fruit (*Prunus padus),*
- dry red dry wheat (*Triticum monococcum),*
- energetic willow - young branches (*Salix viminalis),*
- dried fat grass *(Portulaca oleracea)*
- Bee Bread.

In parallel, they were studied six extracts of 20% glycerol obtained by cold maceration from:

- Aronia-dried fruits (*Aronia melanocarpa),*
- marrow - dried fruit (*Prunus padus),*
- dry red dry wheat *(Triticum monococcum),*
- energetics willow - young branches (*Salix viminalis),*
- dry aerial fat (*Portulaca oleracea)* and
- Bee Bread.

The obtained values to determine the organic silicon content in organic crop products of the beehive product and 20% glycerol selected extracts studied were within the range of 0.06 to 0.6% vegetable products and the product of the hive that extracts selected 0.006- 0.072% to 20% glycerol extracts, summarized as follows:

Table 1

Silicon content of plant products and product hive

Product name	Silicon content,%
Aronia - dried fruit *(Aronia melanocarpa)*	0,06
Bird Cherry - dried fruit *(Prunus padus)*	0,07
Energetics Willow- dried young branches *(Salix viminalis)*	0,12
Bee bread	0,2
Einkorn wheat - dried aerial parts *(Triticum monococcum)*	0,4
Fat Grass - dried aerial parts *(Portulaca oleracea)*	0,6

Table 2

Silicon content in extracts

Product name	Silicon content,%
Arinia extract in glycerol 20% *(Aronia melanocarpa)*	0,006
Bird Cherry extract in glycerol 20% *(Prunus padus)*	0,007
Energetics Willow extract in glycerol 20% *(Salix viminalis)*	0,011
Bee bread extract in glycerol 20%	0,008
Einkorn wheat extract in glycerol 20% *(Triticum monococcum)*	0,041
Fat grass extract in glycerol 20% *(Portulaca oleracea)*	0,072

The graphical representation of the obtained results in the study are shown below:

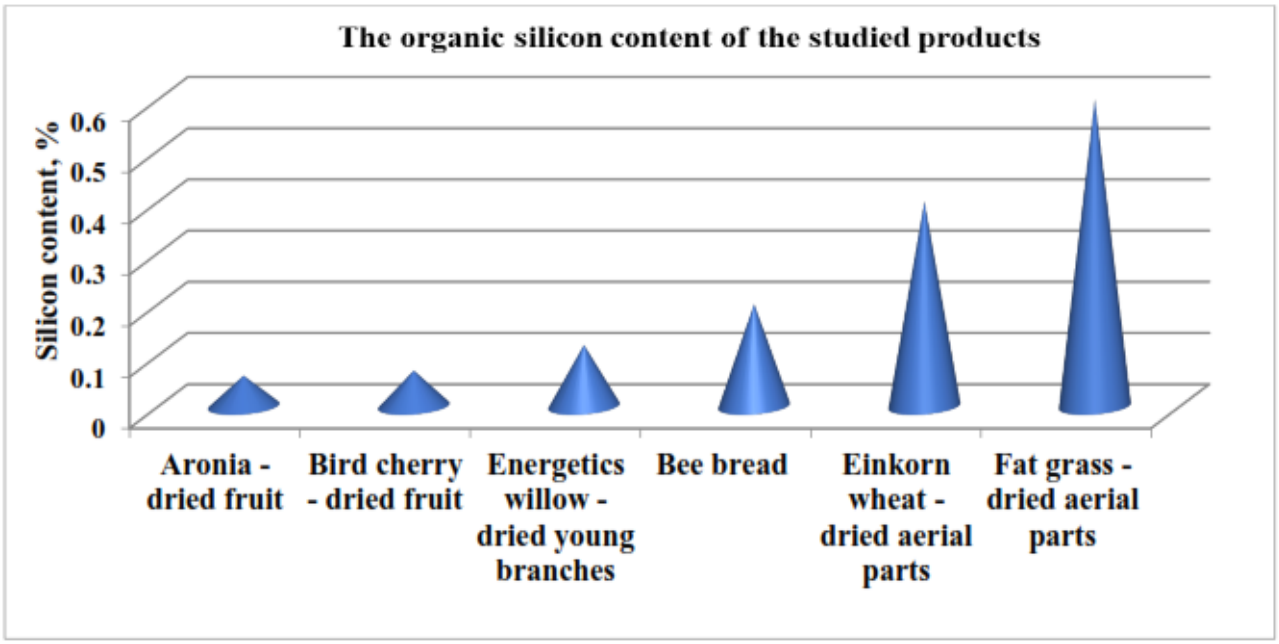

Fig.1 - Graphical representation of organic silicon content in plant products and hives studied

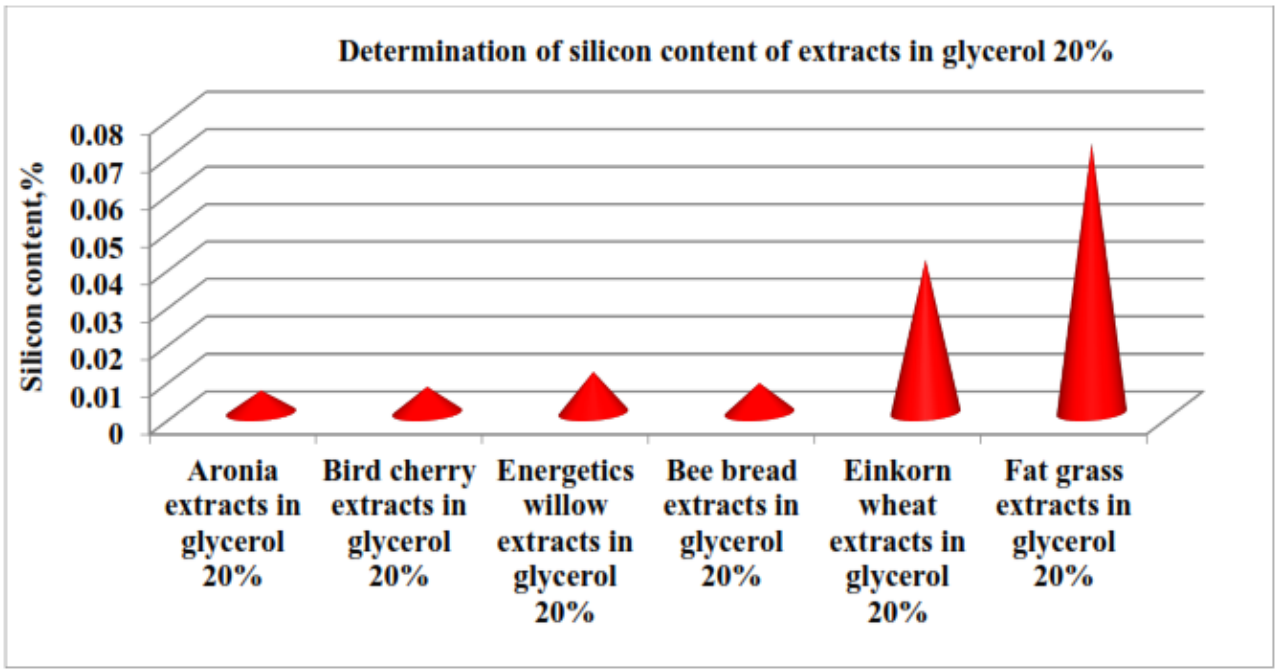

Fig.2 - Graphical representation of organic silicon content in glycerol extracts 20% studied

The obtained values to determine the organic silicon content in organic crop products of the bee hive product and

20% glycerol selected extracts studied were within the range of 0.06 to 0.6% vegetable products and the product of the hive, while in the glycerin extracts 20% studied the content was between 0.006-0.072%, summarized as follows:

CONCLUSIONS:

This study was conducted in order to find new sources of organic silicon for use in obtaining body care cosmetics with protective function of the skin.

Using the flame atomic absorption spectrophotometry (FAAS) was put into evidence the presence of organic silicon, yielding values in the range of 0.06 to 0.6% for the plant and the product of the bee hive products and in extracts with glycerin 20%, 0.006-0.072 %.

Based on the results obtained in the study was established that the vegetable "fat grass-dried aerial parts (*Portulaca oleracea*) and extract in glycerol 20% selected from the aerial parts of fat grass (*Portulaca oleracea*) have a significantly higher organic silicon content to other products studied.

The increased organic silicon content of the natural product of vegetable origin "parts air-dry fat

grass (*Portulaca oleracea*) and 20% glycerol extract from the aerial parts of fat grass *(Portulaca oleracea)* provides the status of the two raw materials of the selected plant in true and rich domestic potential sourses which can be used both in cosmetic industry, pharmaceutical and dietary supplements industry.

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