THE CONTENT OF CAROTENOID PIGMENTS IN ROSA CANINA L. FRUIT

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Received 12 August 2011, accepted 15 November 2011

Abstract: *Carotenoid pigments represent the integral vegetable carotenoids. They are the most widespread of all vegetable pigments. In the animal kingdom, these pigments come from the foods with a plant origin. Carotenoids are yellow, orange, red, purple, etc. colored pigments. In the plant body it is found in free state or in combination with holoprotoids and carbohydrates (carotenoprotoids, carotenoid glycosides). Carotenoid pigments are spread in all plant organs with or without chlorophyll (leaves, fruits, stems, bulbs, seeds, etc.).*
Carotenes are the precursors of retinols, that belong to the class of carotinids – the unsaturated pigments largly widespread in all the plants found in association with chlorophyll, in algae and microorganisms. The ingested carotenoids are absorbed through the intestinal wall in the presence of lipases and bile salts; the absorption is accompanied by oxidation reactions that form trans complete structures. Carotenoids are absorbed especially by the liver in the form of higher fatty acids.
Vegetable pigments give the flavor, the taste and the color of the plant products. They can be part of the constitution of redox coenzymes, some of them are protectors of the enzymes and of the enzymatic activity, adjusting the redox potential of the biochemical environment, others are directly or indirectly involved in the process of photosynthesis.

Keywords: *color substances, enzymatic protectors, the retinol's precusors*

1. Introduction

The carotenoids are lipid-soluble substances with 40 carbon atoms, disposed in a polyenic chain with 18 carbon atoms and 9 double conjugated bonds. At one end of the polyenic chain is grafted a β-ionone cycle and at the other end a α-ionone cycle or an open γ-ionone cycle (pseudo-ionone). Depending on the nature of the ionone cycle, there aare three types of carotenoids – α, β, γ. [1]
Among the vegetable materials with high content of carotenoid pigments are: the carrot, the pepper, the apricots, the tomatoes, the sour cherries, the rose hip fruits. [2]
The fruits of Rosa canina L. are found abundantly in our country, the rose hip has an extended growth area, but the fruits are not processed in terms of carotenoid pigments. The content of carotinids increases gradually in the rose hip fruit beginning with the shaping phase of the fruit until the full ripeness stage, when it reaches maximum value.
Along with aging, the fruits soften, depreciate qualitatively, it decreases the content of useful substances and implicitly the content of carotenoid substances. [3]
There occur interconversions between different types of carotenoids and the proportion between the content of hydrocarbonic carotenoids modifies. [1]
The paper presents the extraction method and the content of total carotenoids from the fruits of Rosa Canina L.
These pigments can be used as a natural dye in food, pharmacy and cosmetic industry, because they are natural and non-toxic. [3]
The content of carotenoids varies with the content of vitamin C, with the altitude and with their position in the field.

Datorită poluării cu noxe chimice, cu praf, apar fenomene de deteriorare rapidă a fructelor de măceş, dimensiuni reduse şi desprinderi de pe ramuri deteriorare rapidă la atingere. [4]
Due to the pollution with chemical emissions, with dust, there occur quick deterioration phenomena of the rose hip fruits, small sizes, easy branches detachments and quick deterioration to the touch. [4].

From the category of fotochemical oxidants, the strongest are the ozone (O_3) and the peroxyacetyl nitrates (PAN). They form as a result of the disturbance of the photolytic cycle of nitrogen diocide and the presence in atmosphere of the hydrocarbons from the combustion processes on the mobile sources (vehicles). [5]

2. Experimental

Material and method
The analysed material are the fruits of Rosa canina L., collected from the spontaneous flora at full maturity from the marked bushes on the route Suceava, Pătrăuţi, Dărmăneşti, Costâna, Pârhăuţi, Todireşti, Cajvana, Arbore, Solca, Clit, Marginea, Rădăuţi, Sucevița, Palma.

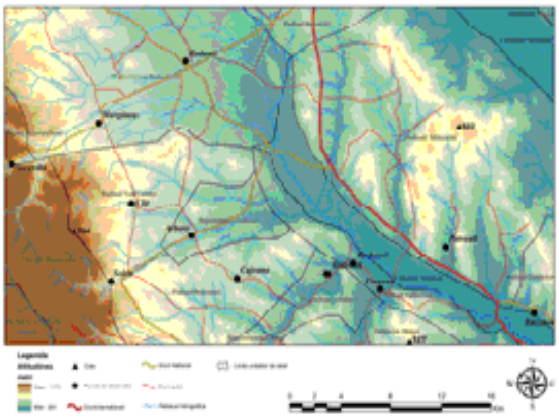

Figure 1. The map of resorts

The principle of the method. The dry vegetable material is triturated with a mix of anhydrous sodium sulphate and calcium oxid, that retain the colored substances except the carotenes. In order to prevent the dissolution of the carotenes in the acid medium, we add an anhydrous sodium carbonate. The carotenes from the triturated mix are extracted using acetone and perol ether.

We measure the color intensity of the etheric solution of carotenes using the spectrophotometer with the wavelength of 450nm (blue filter). The content of carotenoid pigments is calculated according to formula (1).

$$\text{mg carotene\%} = \frac{E_1 \cdot a \cdot v \cdot 100}{E_2 \cdot p} \qquad (1)$$

where:
E_1-the extinction of the investigated sample;
E_2 - the extinction of the standard solution;
a- the number mg of carotene in a ml of standard solution;
v- the volume of carotene solution, ml;
p- the weight of the analysed material.
The pH of the soil was determined using the potentiometric method with a ph-metre WTW, inolab1, in a aqueous solution according to SR 7184- 13:2001. [6]

3. Results and discussions

For the determination we used rose hip fruits collected from the spontaneous during the full ripeness stage from 42 existing biotops within the chosen resorts. The results are correlated both with the chemical composition of the fruits and with the pedographic factors, with the location of the bushes to the pollution sources.
When we compare the obtained results we notice the fact that the rose hip from the

resorts found on the edge of the roads or on countryside roads with heavy vehicles traffic the content of pigments is reduced. The other resorts are next to people's houses or on the way out of the city.

The mobile pollution sources are the one that affect the vegetation with polycyclic aromatic hydrocarbons through the incomplete combustion of fuel, like gas or gasoline, as well of some solid fuel used in domestic heating installations.

The content of carotenoid pigments correlate very well with the soil pH R^2=0,3283. The regression straight line and the dispersal of the individual values is shown in figure 1.

The content values of the carotenoid pigments orient themselves along a curve and we distinguish hereby a logarithmic regression.

The correlation with the altitude of the carotenoid pigments is insignificant. The value of the regression is way below the significant value of 0,5. The values of the carotenoids are scattered, R^2 equaling 0,1367. The graphic representation of the correlation with the altitude is shown in figure 2.

Table 1.
The measured values of the content of carotenoid pigments using the spectrophotometre

Resorts	The content of water in rose hip fruits	Soil pH	Carotenoid pigments in rose hip fruits
	U%		mg%
S1 Suceava	16	7.48	13.42
S2 Pătrăuţi	14.61	4.99	16.75
S3 Dărmăneşti	16	7.12	52.52
S4 Costâna	14.83	6.15	17.11
S5 Părhăuţi	15.69	5.4	15.76
S6 Todireşti	13.93	5.38	19.76
S7 Cajvana	14	4.34	9,37
S8 Arbore	13.58	6.38	36,53
S9 Solca	12.57	6.04	21.64
S10 Clit	12.5	5.17	37.32
S11 Marginea	14	7.29	46.95
S12 Rădăuţi	10	6.56	39.63
S13 Suceviţa	10.75	7.31	62.47
S14 Palma	11.31	6.33	13.26

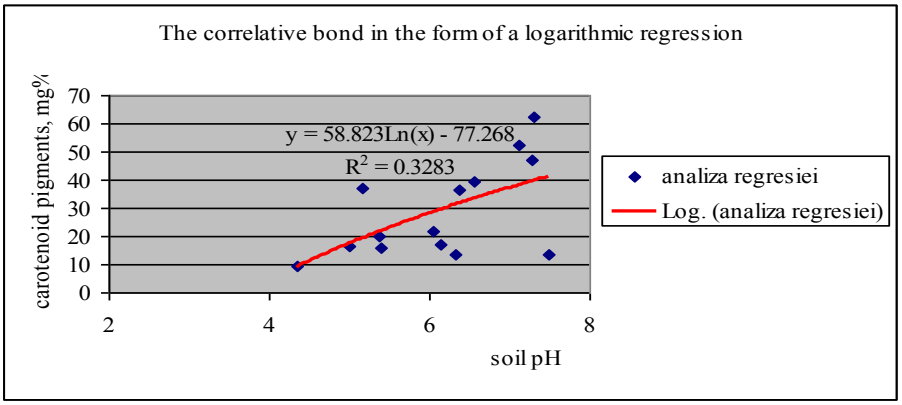

Figure2. The graphic representation of the correlative bond in the form of a logarithmic regression

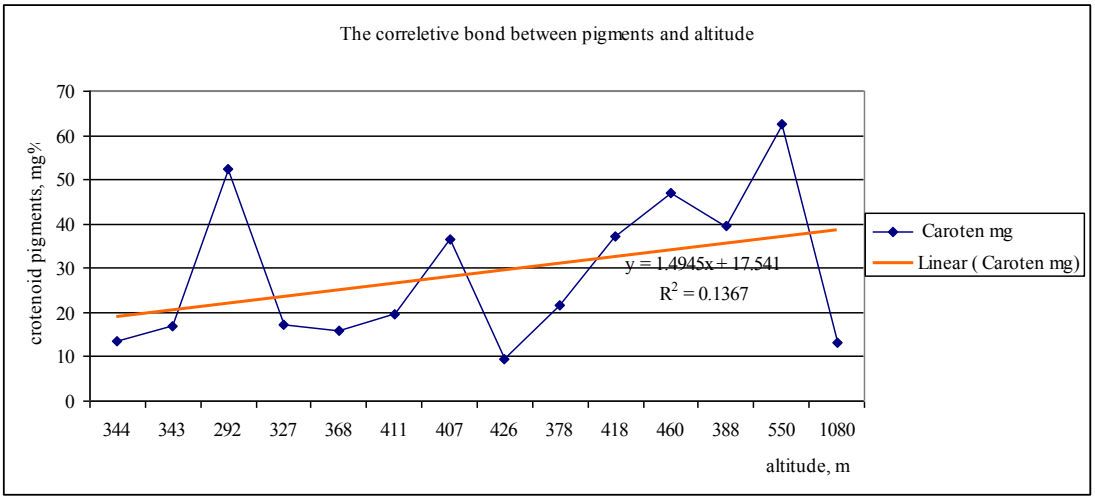

Figure 3. The correlative bond between pigments and altitude

4.Conclusions

The results of the determinations highlight the fact that the carotenoid pigments are found in quantities between 9,37mg% in Cajvana resort and 62,47mg% in Suceviţa.
The different values are due partially to the postion of the bushes around houses, infields, roads with heavy traffic that pollute with dangerous chemical emissions and with aromatic polycyclic hidrocarbons.
The bushes located in the vicinity of infields can be polluted with pesticides and insecticides, organic pollutants used in agricultural treatments.
The dust, the microscopic particles hinder the process of photosynthesis, and as the result, the leaves of the plants fall down earlier or the plants are underdeveloped. Fruits come off easily and fall off the stems.
The content of carotenoid pigments correlate very well with the soil acidity. Good results were registred at a pH betweeb 4 and 8. This value indicates an acid to a slightly alkaline pH. There is a type of behaviour in the case of some plants, that intensify their color when the soil has acid values.
The fruits with low content of carotenoid pigments have been collected from bushes that presented early defoliation, fact that indicates pollution and sediments on the surface of the leaves, all this blocking the plant's photosynthesis.

5. References

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