CORRELATIVE RELATIONSHIP OF PECTIN AND ASCORBIC ACID AT THE BIOTYPES OF THE SPECIES *ROSA CANINA L.* FROM BUKOVINA AREA

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Abstract
The biological material under study is the pseudofruit of *Rosa canina* L. species, collected from 14 stations (Suceava-Palma) in the south of Bukovina. The pectin content analysis was made on average samples of reosehip collected in 2009 and 2010. The analyzed pseudofruit had a pectin content of 14.8% in the stations Pătrăuţi, Dărmăneşti and 11.7% in the station Cajvana. The calculation of the variation coefficient (V%) for the observed biotypes in 2009-2010 provided the possibility of embedding the populations in the medium and homogeneous categories. The pectin content was analyzed in every station on the route Suceava - Palma and correlated to the amount of ascorbic acid in the rosehip powder. The values that express this correlation were determined by linear regression with a linear regression coefficient of $r^2 = 0.544$ which indicated a significant positive correlation.

Key words: pseudofruit, ascorbic acid, pectin.

INTRODUCTION

Pectin is a naturally occurring biopolymer that is finding increasing applications in the pharmaceutical and biotechnology industry. It has been used successfully for many years in the food and beverage industry as a thickening agent, a gelling agent and a colloidal stabiliser. Because the ability of pectins to form gel depends on the molecular size and degree of esterification (DE), the pectin from different sources does not have the same gelling ability due to variations in these parameters.Therefore, detection of a large quantity of pectin in a fruit alone is not in itself enough to qualify that fruit as a source of commercial pectin (Thakur et al., 1997).

At present, commercial pectins are almost exclusively derived from citrus peel or apple pomace, both by-products from juice (or cider) manufacturing. Pectin has applications in the pharmaceutical industry. Pectin favaorably influences cholesterol levels in blood. It has been reported

to help reduce blood cholesterol in a wide variety of subjects and experimental conditions as comprehensively reviewed (Sriamornsak, 2001). Pectin acts as a natural prophylactic substance against poisoning with toxic cations. It has been shown to be effective in removing lead and mercury from the gastrointestinal tract and respiratory organs (Kohn, 1982).

Vitamin C is an antioxidant, along with vitamin E, beta-carotene, and many other plant-based nutrients. Antioxidants block some of the damages caused by free radicals, substances that damage DNA. The build-up of free radicals over time may contribute to the aging process and the development of health conditions such as cancer, heart disease, and arthritis.

MATERIAL AND METHOD

The biological material under study is the fruit of the species *Rosa canina L.*, fruit whose scientific name is *Cynosbati fructus* and is harvested from spontaneous flora. We selected 14 observation stations on the route Suceava-Palma and in each station we marked three biotypes. The vegetal material was dried under natural conditions (a temperature of max. 25°C, natural ventilation) and was milled into rose hip powder.

Pectic acid precipitation by $CaCl_2$ and gravimetric determination of Ca pectate. To do this, the sample is boiled in a slightly acidic solution for the hydrolysis of protopectin. The resulting product was treated with NaOH. The result is the sodium salt of pectic acid. Pectic acid is released with an excess of a weak acid (acetic acid) and then precipitated with a solution of $CaCl_2$ in the form of calcium pectate.

From rosehip powder was determined the ascorbic acid. The amount of weighed sample is placed in a mortar, 20 cm^3 metaphosphoric acid, 2% solution is milled as quickly as possible, and then transferred quantitatively into a 100 cm^3 graduated cylinder. 2-5 cm^3 acid extract is pipetted and distilled water is added in order to reach the volume of 5cm^3. 1.3-1.4 cm^3 sulfuric acid and 0.7 cm^3 solution of sodium sulfide are mixed and allowed to rest for 10 - 15 minutes. Then we add 1 cm^3 mercuric chloride solution, complete with distilled water up to the mark, then we mix and filter. From the filtrated solution 2-5 cm^3 (V4) are pipetted in a 50 cm^3 Erlenmeyer flask. We add an equal volume of buffer solution and we titrate with a solution of indophenolic dye.

Calculation: Vitamin C = $(V_1 - V_2)$ T V_3 1oo/V_4 m , mg/100g

Where:

V_1 – the volume of 2-6-diclorphenolindophenol solution used for the direct titration of ascorbic acid and dehydroascorbic acid, in cm^3

V_2 – the volume of 2-6-diclorphenolindophenol solution used for the titration of the reducers, in cm^3

T – the titer of the 2-6-diclorphenolindophenol soultion, in mg/l

V_3 – the volume at which the studied sample amount was diluated, in cm^3

V_4 – the volume of acid extract used for titration, in cm^3 , after the reduction with Na_2S

m – the amount of the analyzed product, in g

RESULTS AND DISSCUSIONS

The ascorbic acid in 2009 showed similar values at inter-population level, the average in stations being 545,08mg/100g. The minimum was obtained from fruits harvested in Costâna station (462,19 mg/100g). The highest content of vitamin C content was registered in the fruit harvested in Marginea station (Figure 1). In 2010, the ascorbic acid content station average was 544,43mg/100g (Figure 79). The lowest values were registered in Costâna (466.28 mg/100g) and Cajvana (477.82 mg/100g). A high content of vitamin C was registerd in the stations Rădăuti (603.39 mg/100g) and Palma (592,87mg/100g) (Figure 2).

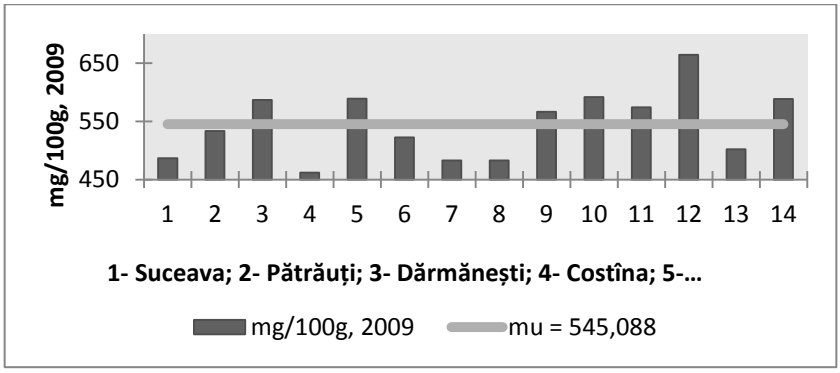

Figure 1. Vitamin C content variation in 2009

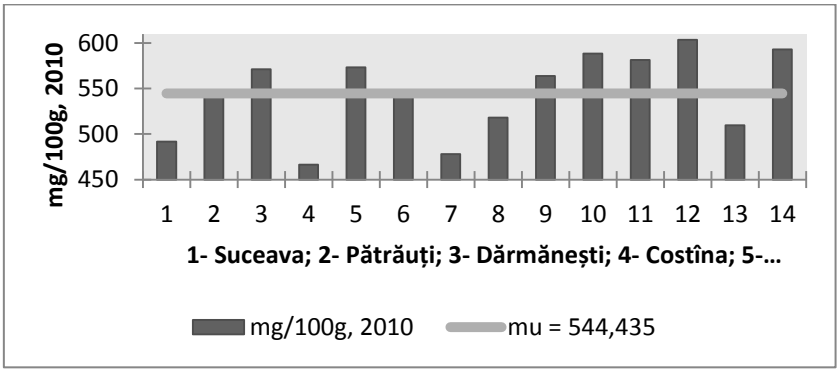

Figure 2. Vitamin C content variation in 2010

The descriptive analysis confirmed the homogeneous nature of the studied populations. The variation coefficient for vitamin C content in stations is between 10.62 (2009) and 8.25 (2010) as shown in Table 1.

Table 1. The descriptive analysis of the studied populations in vitamin C content 2009-2010

Variables	Stations	Min.	Max.	Average	Standard deviation	Variation coefficient, %
mg/100g 2009	14	462.100	663.780	545.088	57.918	10.62
mg/100g 2010	14	466.280	603.390	544.435	44.946	8.25

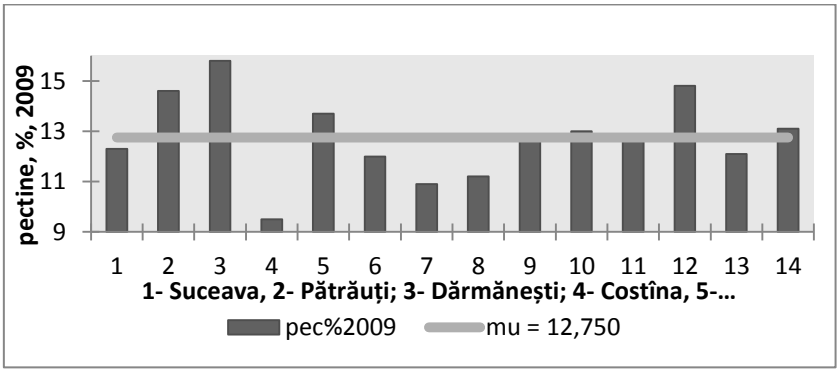

Figure 3. Pectine content variation in 2009 in the stations Suceava-Palma

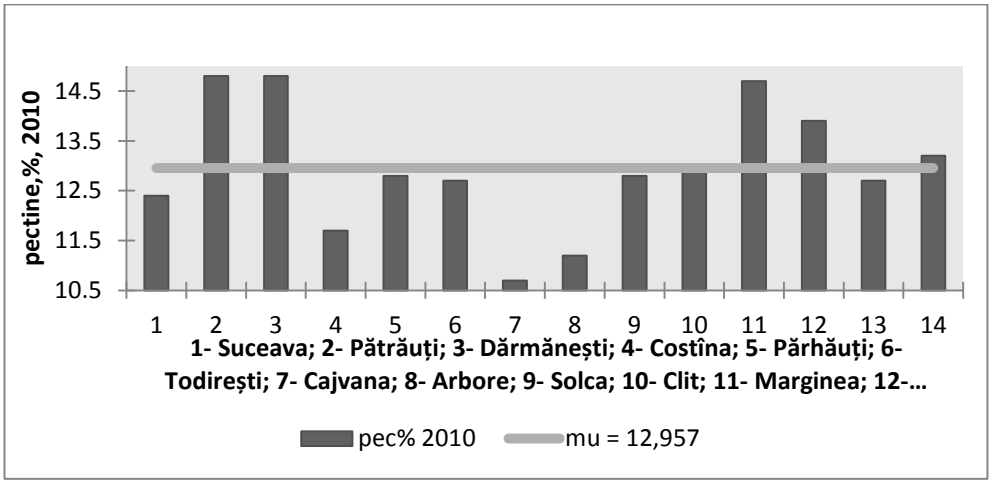

Figure 4. Pectine content variation in 2010 in the stations Suceava-Palma

Classification of stations on ranks depending on the vitamin C content of the pseudofruits, table 2.

Table 2. Stations classification on ranks by vitamin C content

Stations	The place occupied at station level in 2009 and 2010		Rank
Suceava	11	12	D
Pătrăuţi	8	8	C
Dărmăneşti	5	6	B
Costîna	13	14	A
Părhăuţi	3	5	E
Todireşti	9	9	A
Cajvana	12	13	A
Arbore	12	10	D
Solca	7	7	C
Clit	2	3	D
Marginea	6	4	B
Rădăuţi	1	1	E
Suceviţa	10	11	D
Palma	4	2	A

In 2010, the analyzed fruits had a content of between 14.8% (in Pătrăuţi and Dărmăneşti) and 11.7% (in Cajvana), Figure 4. The average content of pectin in the 14 stations is 12.97%. The amount of pectin determined by chemical analysis can be compared to previous studies in the

field. Pârvu (1997) indicates a content of 11-25% and foreign studies indicate a pectin content in the species *Rosa Canina L.* of 4,90- 5,26% (Mabellini A. et al., 2011).

The analysis of the main components for the vitanin C and pectine variables sperates the stations in two levels, on the right and on the left of the F1 axis. This indicates that the stations can be grouped by common characteristics. On the left there are the stations Rădăuti, Marginea, Dărmănesti, Clit and Palma. They have a high content of vitamin C, respectively pectine.

The stations Arbore and Costîna present data that differs from the common characteristics of the other stations, fact that isolares them from the other stations.

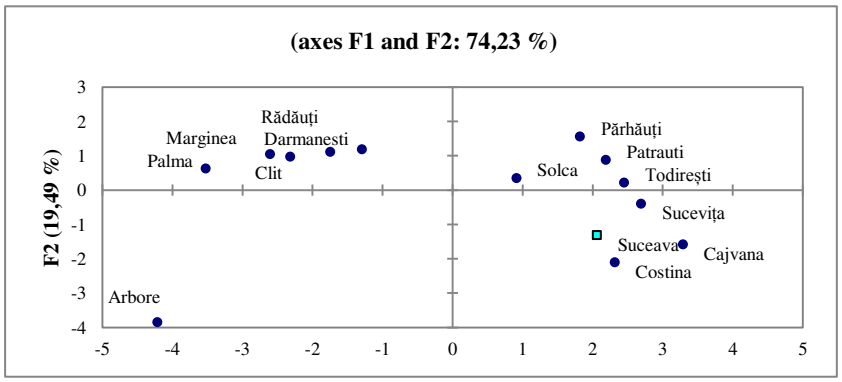

Figure 5. The analysis of the main components for the variables vitamin C and pectine content in the stations Suceava-Palma

The pectine content analyzed in each station on the route Suceava-Palma correlates significantly positive with the amount of vitamin C in rosehip powder obtained in the same stations. The values that express this correlation were determined by linear regression. The correlation coefficient r^2 is presented in the figures 6 and 7.

Vitamin C and pectine content correlate significantly positive in 2009. The linear regression coefficient indicates this correlation. In 2010 the studied variables correlated significantly positive. The correlation coefficient was r^2 =0.535.

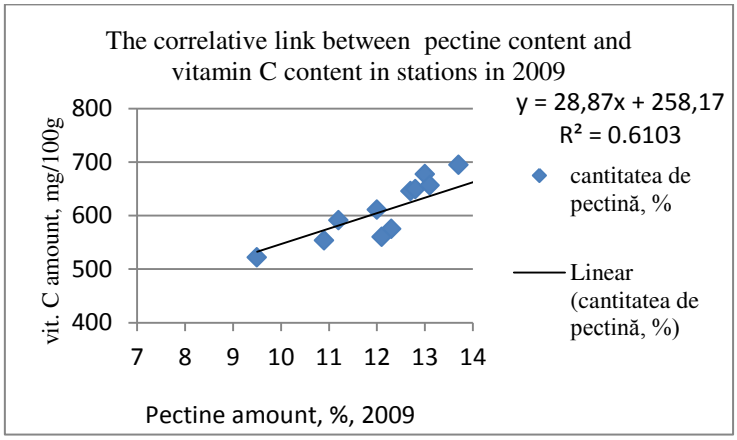

Figure 6. The correlative link between pectine content and vitamin C content in rosehip powder in the stations, in 2009

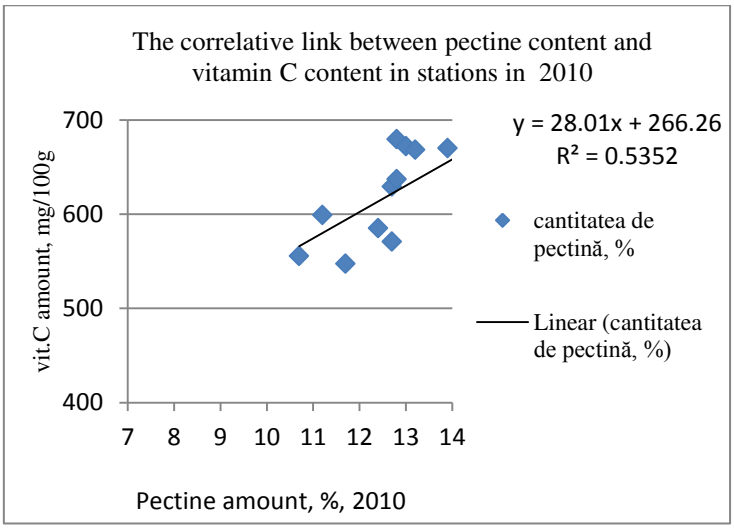

Figure 7. The correlative link between pectine content and vitamin C content in rosehip powder in the stations, in 2010

Concluzii

Rosehip is ruderal species, with ecological role, being included in restoring forest ecosystems, wildlife conservation, land improvement (Guner, Ozkan and Çomez, 2011; Demir and Özcan, 2001). The high content of pectin and vitamin C in the species pseudofruits offers the possibility of using rosehip

in food industry for the production of marmalade, syrup, jelly or infusion tea. It plays an important role in stimulating the immune system of the consumers.

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