

## PRELIMINARY RESEARCH REGARDING SOME GENOTYPES OF ROSEHIP IN LOCAL POPULATIONS FROM BACĂU COUNTY

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**Key words:** rosehips, biometric analysis

### INTRODUCTION

The rosehips contain large amounts of vitamins (mainly C vitamin), minerals, fatty acids, carotenoids, flavonoids, sugars, aminoacids, and essential oils. Their therapeutic properties are: fortifying, tonic, facilitate the peripheral blood circulation through capillary blood vessels, stimulate bile secretion, soothen liver damage, stomach aches, intestinal inflammation, prevent kidney stones, ameliorate cough and hoarse voice.

There is a well-known fact that *Rosa canina* L. is very rich in C vitamin and polyphenols. The latter ones are antimutagene and antitumoral compounds.

Clinical studies on obese patients proved the cardioprotective effects of the rosehip powder. Six weeks afterwards, their blood pressure decreased, as well as the total amount of cholesterol, and more importantly, the LDL amount. (Andersson U., Berger K., 2012). Fruit extracts were tested on tumor cells (human colon cancer cells CaCo-2) in vitro. The antioxidant effects resided in an antiproliferative effect on cancer cells (Cagle P. et al, 2012).

Furthermore studies confirmed the cytotoxic effect of the rosehip extracts on human colon adenocarcinoma (WiDr) compared to the normal colon cells (CCD841CoN). The fruit extract induced the apoptosis of the cancer cells (Turan I, Demir S., 2017).

Another in vitro experimental study pointed out that the rosehip extracts decrease cell proliferation of three different cell lines of human glioblastoma, (Cagle P. et al., 2012).

### MATERIAL AND METHODS

The present scientific study describes the variability of fruit (rosehips), that were harvested during the autumn of 2021 (late September). Previous field trips followed in June to observe the local populations of *Rosa canina* L. within three communes in order to select the five investigated populations. The GPS coordinated are pointed out on the following map (Fig. 1). The GPS coordinates were:

Population no.1	Population no. 2	Population no. 3	Population no. 4	Population no. 5
Latitude: 46°39'14.67"N	Latitude: 46°39'21.42"N	Latitude: 46°40'33.71"N	Latitude: 46°40'38.15"N	Latitude: 46°40'54.46"N
Longitude: 26°49'28.75"E	Longitude: 26°48'59.31"E	Longitude: 26°44'50.53"E	Longitude: 26°44'18.82"E	Longitude: 26°45'28.46"E



Fig. 1. GPS coordinates for the researched populations

The individual parameters that we monitored and searched were: the shrub's shape and height, the fruit number/shrub, the shape, size, colour and weight/fruit.

All the above considered, there were nine different genotypes within the five populations. The rosehips were randomly harvested (200 fruit per each population). There were observed and quantified the following characters: colour, length, weight, and diameter. The biometric results were statistically processed and interpreted, computing the arithmetic mean ( $\bar{X}$ ), the standard deviation (s), the coefficient of variation (s%), the standard deviation's error ( $s\bar{X}$ ), and the arithmetic mean's error ( $s\bar{X}\%$ ).

The data were analyzed by means of Microsoft Office 365.

## RESULTS AND DISCUSSIONS

The researched area is situated in the county of Bacău. It comprises wide surfaces with *Rosa canina* L. Nine genotypes belonging to five rosehip populations within native habitats from Gârleni, Blăgești, and Racova communes were studied (Fig. 6-9). There were analyzed 200 rosehips per each GPS location. The GPS coordinate represents the central area of the studied population.

The randomly harvested rosehips displayed a wide variability of the following parameters: number of fruit/shrub, various shapes and sizes, as well as a wide range of colour shades from light red to dark purple and orange. These genotypes may be useful in the amelioration, regarding the fresh biomass/fruit. The fruit's average length varied from 19.71 mm (a genotype from the population number five – Racova

village) to 23.00 mm (a genotype within the number two population – Gârleni village), (table 1).

The arithmetic mean's error assess that the computation is very accurate, as the parameter's variability is low (s% below 10), a normal feature residing in the fact that the rosehips belong to one species and one genotype, respectively.

There was noticed an exception: the biometric measurements within the no.3 population (Racova village) for which the value of s% is 11.55. We may assess that the variability is low for that population, as well.

Regarding the largest fruit diameter, the values ranged between 11.03 mm for the populations no.3 and no.5 (both originating in Racova village) and 15.94 mm for the no. 4 population (Buda village), (table 2). The value of  $s\bar{X}\%$  displayed that the arithmetic mean is certain, and the variability in each studied genotype is below 10. The highest variability of the fruit diameter (9.16 mm) was registered in the no. 4 population, and the lowest (5.80 mm) was found for the rosehips of the no.1 population.

The fruit/density/shrub (the yield of rosehips) and the average fruit weight were further analyzed. The yield is very important from an economic viewpoint, because the entire area abounds in *Rosa canina* L. shrubs, that may be capitalized. The third table above displays the data for all the biometric measurements. The average fruit weight ranged between 1.31 g (in population no. 4 – Buda village) and 3.0 g (population no. 3 in Racova). There is a high variability for the parameter fruit weight, reflected by the coefficient of variation (s%) that was above 20 in two out of five researched populations.

Table 1. The fruit length (mm) of several genotypes of *Rosa canina* L.

Population/Genotype Bacău county	Statistics for the parameter <i>fruit length</i> (mm)				
	$\bar{X}$	s	s%	$s\bar{X}$	$s\bar{X}\%$
Population no.1	22.60	2.38	10.53	0.24	1.05
Population no. 2	23.00	2.40	10.40	0.24	1.04
Population no. 3	22.95	2.65	11.55	0.26	1.15
Population no. 4	20.40	2.01	9.85	0.20	0.98
Population no. 5	19.71	1.50	7.61	0.15	0.76

Table 2. The fruit diameter (mm) for several *Rosa canina* L. genotypes

Population/Genotype Bacău county	Statistics for the parameter <i>fruit diameter</i> (mm)				
	$\bar{X}$	s	s%	$s\bar{X}$	$s\bar{X}\%$
Population no.1	13.27	0.77	5.80	0.08	0.58
Population no. 2	12.09	0.82	6.78	0.08	0.68
Population no. 3	11.03	0.96	8.70	0.10	0.87
Population no. 4	15.94	1.46	9.16	0.15	0.94
Population no. 5	11.03	0.96	8.70	0.10	0.87

There was pointed out a high variation in the parameter fruit colour, from yellowish-orange to dark purple. Considering that the rosehips were harvested during late September, it is possible that some colour variations were a consequence of different ripening and maturation phases.

As a conclusion regarding the fruit length, one may assess that the longest rosehips belonged to the populations no. 2 and no. 3, and the shortest were collected within the no.5 population. The graphs (Fig. 2-5) display the above mentioned results:

The highest values in fruit diameter were provided within the no. 3 population, and the lowest

in the no. 4 population. These data are presented in the next graph:

The highest values for the fruit weight (g) were provided for the no 3 population, and the lowest - for the no 4 population.

Regarding the yield of the five studied populations of *Rosa canina* L., we may confirm that the highest value was obtained for the population no. 3 from Racova. This population lies in the Bistrița river's major river bed and meadow. The microclimate is nevertheless more favourable, compared to the other populations' we observed.

Table 3. The fruit weight (g) in some analyzed *Rosa canina* L. genotypes

Population/Genotype Bacău county	Statistics for the parameter <i>fruit weight</i> (g)				
	$\bar{x}$	s	s%	$s\bar{x}$	$s\bar{x}\%$
Population no.1	1.99	0.36	18.05	0.04	1.80
Population no. 2	1.68	0.33	19.56	0.03	1.96
Population no. 3	3.00	0.82	27.28	0.08	2.73
Population no. 4	1.31	0.31	23.61	0.03	2.36
Population no. 5	1.70	0.31	18.19	0.03	1.81

Table 4. The data for some morpho-physiological parameters in some *Rosa canina* L. native populations

Population/Genotype Bacău county	Statistics for the morpho-physiological parameters			
	Fruit length (mm)	Fruit diameter (mm)	Fruit weight (g)	Fresh biomass for 200 rosehips (g)
Population no.1	22.60	13.27	1.99	400.2
Population no. 2	23.00	12.09	1.68	339.2
Population no. 3	22.95	15.94	3.00	602.2
Population no. 4	20.40	11.03	1.31	165.2
Population no. 5	19.71	12.90	1.70	343.0

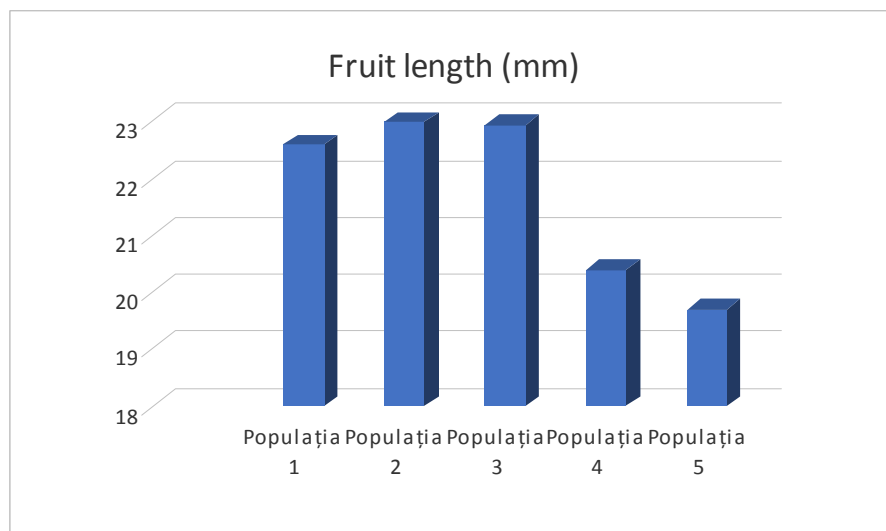


Fig. 2 Data regarding the fruit length of the five studied populations

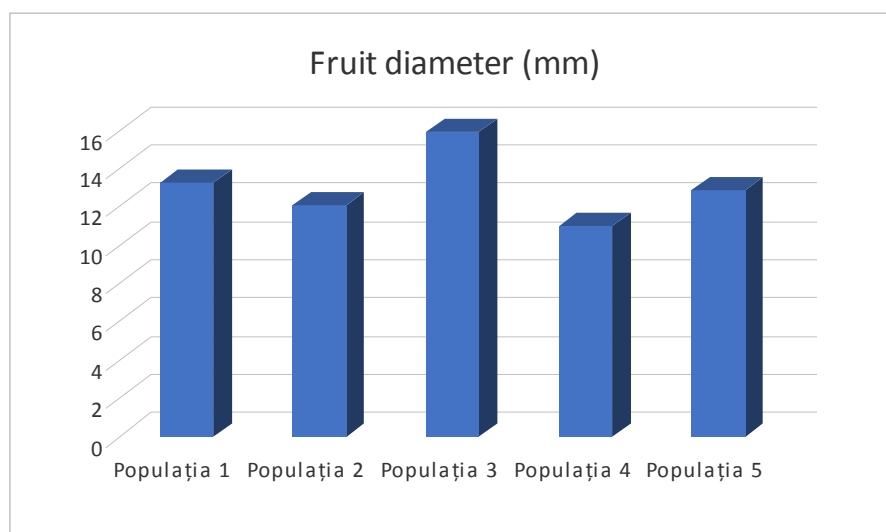


Fig. 3. Data on the fruit diameter

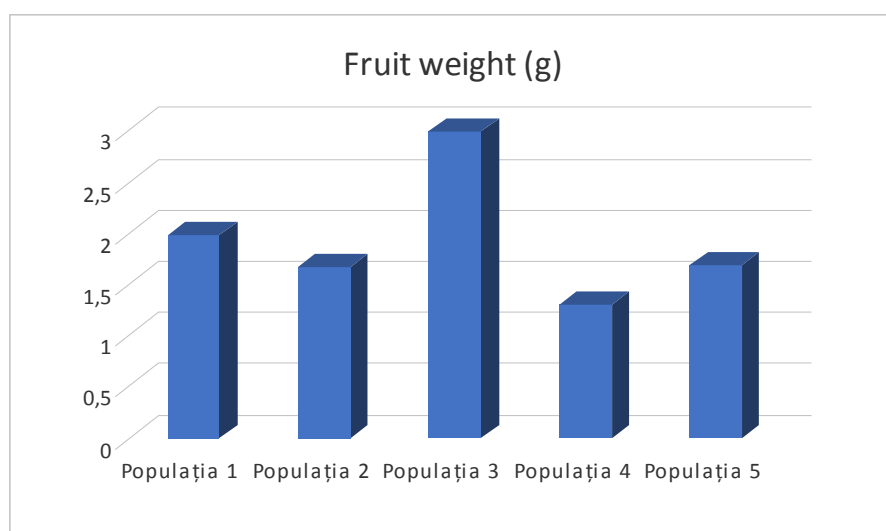


Fig. 4. Data regarding the fruit weight (g)

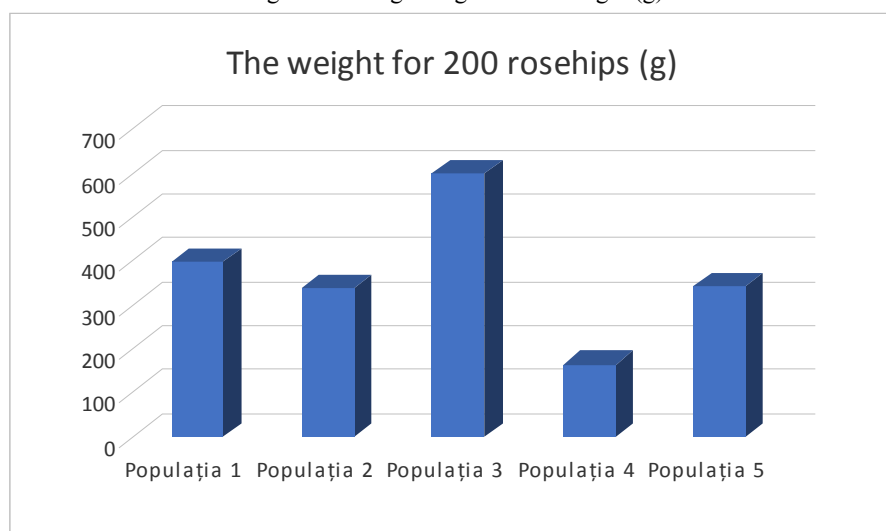


Fig. 5. Data for the fruit biomass (g)



Fig. 6. *Rosa canina* L. in bloom (Racova village, Bacău county)



Fig. 7. *Rosa canina* L. in bloom (Gârlenii de Sus village, Bacău county)



Fig. 8. *Rosa canina* L. in bloom (Buda village, Bacău county)



Fig. 9. *Rosa canina* L., persistent rosehips from the year before (Gârlenii de Sus village, Bacău county)

## CONCLUSIONS

There were studied nine genotypes of *Rosa canina* L., belonging to five native populations from Bacău county, during 2021. T

The rosehips were harvested and observed (200 fruit/each GPS location).

A rather large variability was noticed in our survey on rosehip fruit, regarding fruit number/plant, fruit shape and size, as well as colour range (dark red to orange).

The biometric results were statistically processed and interpreted, computing the arithmetic mean ( $\bar{X}$ ), the standard deviation (s), the coefficient of variation (s%), the standard deviation error ( $s\bar{X}$ ), and the arithmetic mean's error ( $s\bar{X}\%$ ). Based on the turnover of the investigated five plant populations, the highest score was provided by population number 3 (from Racova village). Its microclimate is more favourable, compared to the other populations' we observed.

Further studies (especially biochemical analysis of the C vitamin amount) on other rosehip populations will complete our research.

## ABSTRACT

This present paper comprises a research on the biology and importance of a well-known species, namely the rosehip (*Rosa canina* L.). All the experimental data may represent a starting point for its medicinal and phytotherapeutical research. The rosehip is a perennial shrub. The fruit colour ranges from red to orange. The rosehips contain large amounts of vitamins (mainly C vitamin) (Egea I. et al, 2010), minerals, fatty acids, carotenoids, flavonoids, sugars, aminoacids, and essential oils. Their therapeutic properties are: fortifying, tonic, facilitate the peripheral blood circulation through capillary blood vessels, stimulate bile secretion, soothen liver damage, stomach aches, intestinal inflammation, prevent kidney stones, ameliorate cough and hoarse voice. There were studied nine genotypes of *Rosa canina* L., belonging to five native populations from Bacău county. The rosehips were harvested and observed (200 fruit/each GPS location). A rather large variability was noticed in our survey on rosehip fruit, regarding fruit number/plant, fruit shape and size, as well as colour range (dark red to orange). Based on the turnover of the investigated five plant populations, the highest

score was provided by population number 3 (from Racova village). This population lies in the Bistrița river's major river bed and meadow. The microclimate is nevertheless more favourable, compared to the other populations' we observed. Further studies on other rosehip populations will complete our research.

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