

## THE BIODIVERSITY STUDY OF SOME *ROSA CANINA* L. GNEOTYPES FROM OLTENIA AREA

RODICA SOARE, MARIANA NICULESCU, OVIDIU PĂNIȚĂ, DORINA BONEA, PAULA IANCU

University of Craiova, Faculty of Agriculture and Horticulture

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### ABSTRACT

*In this paper there was studied the variability of some morphological characters from Rosa canina genotypes of 20 local populations from different areas from central and northern part of Oltenia, Valcea County, and also plant association where there were found those ones. The results were statistically interpreted by analysis of variance, Pearson Correlations and PCA (Principal Component Analysis).*

*There were identified 3 populations groups: first group with 6 genotypes with high values for both shoot length and flower diameter; second group with 9 genotypes and has low values for both shoot length and for the flower diameter (both negative components) and third group with 5 genotypes and has low values for shoot length and high values for flower diameter. The great variability identified inside of studied populations is probably caused by the altitude and the phytosociological associations.*

### INTRODUCTION

*Rosa canina* L. (common name Wild rose, Thorn, Rosehips) is a shrub in the spontaneous flora of Romania. Taxonomic position: *Rosaceae*, *Rosoideae*, *Rosa* L. subgenus *Eurosa* Focke, section *Cinnamomeae* (DC.) Rehder.

Section *Caninae* is very important in the subgenus *Eurosa*, which contains all but four of the approximately 150 *Rosa* species in the world (Tutin, T.G., (eds.), 1964–1980 & 1993) (M. Niculescu, 2014).

The shrubs have heights of 2-3m, arched branches, recurved and strong thorns and small red buds. Imparipennate leaves are compound with seven ovate-elliptic leaflets, glabrous on both sides. The flowers are pinkish-white, terminal, solitary or grouped and fruits are ellipsoidal with numerous small hairy achenes. The species presents large variations of the climatic factors, with reduced requirements to vegetation factors, supporting well compact soils and even degraded ones (Nețoiu et al., 2008).

*Rosa canina* L. are important as rootstocks in rose breeding process (Wagner, 2002; Nețoiu et al., 2008) as a shrub in protective or defensive fences (Soare et al., 2009) and as an ameliorating soil species (Nețoiu et al., 2008). Besides these uses, rosehip has important medicinal and food, because it contains vitamins, especially C vitamin (Kazaz et al., 2009; Mabellini et al., 2011).

Although in some countries, such as Bulgaria, Turkey, the Netherlands, etc., there are big *Rosa canina* crops, in Romania there is recent experimental plantation established with varieties, types and forms of *Rosa canina* selected from Institute for Horticulture Research and Development, Mărăcineni, Pitești.

Rosehip species biodiversity in the Oltenia area, Romania has been less studied so far. Recent research conducted in this area, on the technological characteristics and biochemical variability, valuable genotypes were identified (Soare et al., 2014a,b).

To promote valuable forms for breeding process of this species is necessary to study the variability of vegetative and reproductive morphological characters. In this way, the purpose of this study was to identify the existing variability of the local population from Vâlcea County, Romania.

## MATERIALS AND METHODS

In this study were studied twenty local populations from Oltenia area, Vâlcea county from five villages with different altitudes: Balcești (234-240 m), Tetoiu (400-410 m), Lapus (350-358 m), Horezu (470-540 m) and Slatioara (540-600 m). The analyzed biotypes came from spontaneous florain areas rich in Rosehips bushes. The *Rosa canina* species presents 55 intertaxa, 8 Varieties and 43 forms. Therefore, there were analyzed these populations in phytosociological terms of in this area.

Within these populations variability of some morphological parameters: length of sprouts, flower diameter, medium number of inflorescences/shoots, petal length, petal width, leaf length and width. Determinations and biometric measurements were made in June, 2014. The results were statistically interpreted by analysis of variance using Microsoft Excel and calculating the means, standard deviations, variance, range, count, 95% confidence level. Also were calculated Pearson Correlations and PCA (Principal Component Analysis).

## RESULTS AND DISCUSSIONS

The analyzed morphological characteristics show great variability from one genotype to another, indicating the possibility of selection of new genotypes.

In the studied populations, length of sprout has recorded an average of 12.70 cm and a variation amplitude from 6.88 to 21.85 cm, the difference being 3.1 times higher than in a genotype to another. For flower diameter was recorded an average of 4.58 cm and an amplitude of variation from 2.85 to 5.71 cm, the difference being 2 times higher.

Number of inflorescences/shoot recorded an average of 2.95 and a variation amplitude from 2.1 to 4.5 difference being 2.1 times higher. Regarding the length of the petals, it was recorded an average of 2.11 cm and an amplitude of variation from 1.57 to 2.59 cm, the difference being 1.6 times higher. On average, petal width was 2.22 cm, the amplitude of variation from 1.53 cm to 2.65 cm, and the difference was 1.7 times higher.

The leaf length recorded an average of 7.87 cm, an amplitude of variation from 5.67 to 11.07 cm, the difference being 1.9 times higher and for leaf width, the average was 5.52 cm, the amplitude of variation from 4.41 cm to 7.73 cm and 1.7 fold difference from one to another genotype (Table 1).

Table 1

**Descriptive statistics for *Rosa canina* populations.**

Specification	Shoot length (cm)	Flower diameter (cm)	No. inflorescence/shoot	Petal length (cm)	Petal width (cm)	Leaf length (cm)	Leaf width (cm)
Media	12.70	4.58	2.95	2.11	2.22	7.87	5.52
Standard Error	4.82	1.14	0.72	0.44	0.41	1.79	1.11
Standard Deviation	3.42	0.68	0.59	0.25	0.27	1.29	0.84
Sample Variance	11.74	0.47	0.35	0.06	0.07	1.68	0.71
Range	14.97	2.86	2.4	1.02	1.12	5.4	3.32
Minimum	6.88	2.85	2.1	1.57	1.53	5.67	4.41
Maximum	21.85	5.71	4.5	2.59	2.65	11.07	7.73
Count	20	20	20	20	20	20	20
Confidence Level 95 %	10.51	2.50	1.57	0.96	0.89	3.90	2.43

Regarding the correlations between characters, the highest correlations were recorded between: width and diameter of flower petals ( $r=0.760$ ); leaf width and length ( $r=0.673$ ) and length and width of their petals ( $r=0.663$ ). Other positive correlations were recorded between the length of the flower petals and diameter ( $r=0.555$ ) and between shoot length and leaf length ( $r=0.470$ ) (table 2).

Table 2

### Correlations between studied morphologic characters

Character	Shoot lenght	Flower diameter	No. of inflorescence	Petal lenght	Petal width	Leaf lenght
Flower diameter	0.317	-	-	-	-	-
No. of inflorescence	0.279	-0.198	-	-	-	-
Petal lenght	0.318	0.555**	-0.218	-	-	-
Petal width	0.194	0.760***	-0.098	0.663***	-	-
Leaf lenght	0.470*	0.275	-0.122	0.300	0.358	-
Leaf width	0.343	0.275	0.004	0.361	0.397	0.673***

P 5%=0.42; P 1%=0.53%; P 0.1%=0.65

From Table 3 it can be seen that only three of the seven analyzed factors influenced in percentage of 93.289 the total variance, which is the length of sprouts (60.466%), flower diameter (20.921%) and number of flowers (11.901%).

Table 3

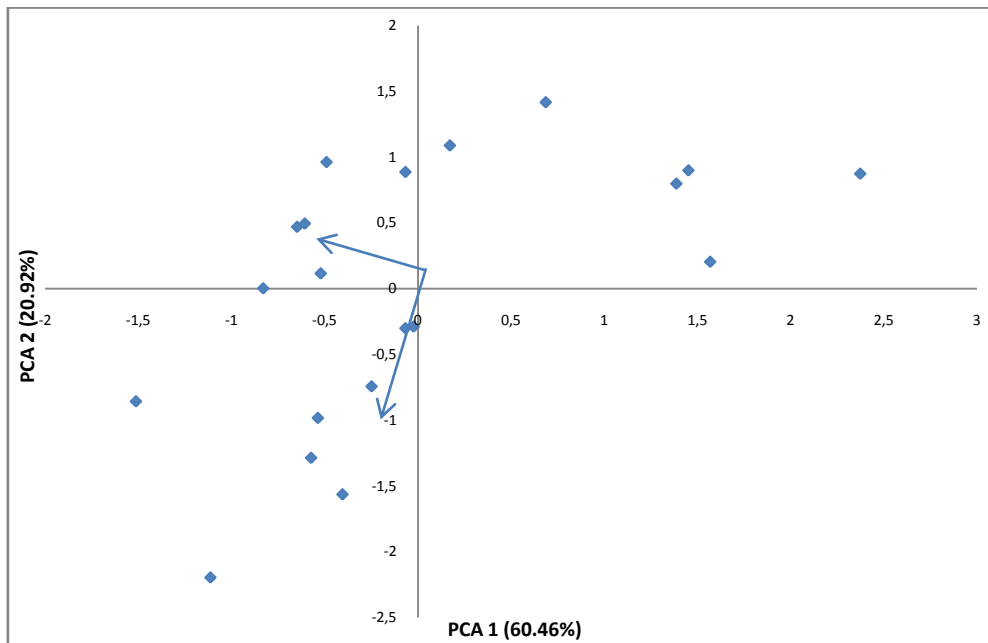
### Eigenvalues and component score coefficients

Component	Initial Eigenvalues			Component Score Coefficient Matrix	
	Total	% of Variance	Cumulative %	1	2
Shoot lenght (cm)	4.233	60.466	60.466	-0.174	-0.121
Flower diameter (cm)	1.465	20.921	81.387	0.462	-0.074
No. inflorescence/shoot	0.833	11.901	93.289	0.023	-0.157
Petal lenght (cm)	0.271	3.874	97.163	0.418	-0.075
Petal width (cm)	0.112	1.599	98.762	0.291	-0.131
Leaf lenght (cm)	0.055	0.783	99.546	-0.083	0.542
Leaf width (cm)	0.032	0.454	100.000	-0.077	0.722

The analysis of principal component was applied to highlight the morphological characters, such as various species of trees (Sofletea et al., 2011) and productivity, as in paprika pepper, bell pepper (Ciulca et al., 2010, Madoșa et al., 2010).

In this study, the plot was done for the first two components, namely the length of sprouts (PCA 1) and diameter of flowers (PCA 2). Thus, we have identified three groups with the following characteristics:

- Group I has 6 genotypes with high values for both shoot length and flower diameter (both positive components);
- Grup II has 9 genotypes and has low values for both shoot length and for the flower diameter (both negative components);
- Grup III with 5 genotypes and has low values for shoot length and high values for flower diameter.



**Fig.1. Plot of the first two principal components (PCA1 and PCA2). Eigenvalues for each two principal component are listed in parentheses.**

The analyzed rosehips populations are from different phytocenosis. Thus, the investigations in Vâlcea County, there was a great phytocoenotic variability of the species and of the infrataxons of this one. In this area, *Rosa canina* and its inter-taxa is found in natural communities (Rodwell, et al., 2000): in the pure beech forests - *Symphyto cordati-Fagetum* Vida (1959) 1963); in the mixed forests of beech and fir tree - *Pulmonario rubrae-Fagetum* (Soó 1964) Täuber 1987; in the alder tree groves - *Stellario nemori-Alnetum glutinosae* (Kärstner 1938) Lohm. 1957 and *Telekio speciosae-Alnetum incanae* Coldea (1986) 1990; in the underwoods edified by *Prunus spinosa* and *Crataegus monogynya* (Niculescu, M., 2009), in the *Coryletum avellanae* Soó 1927, *Pruno spinosae-Ligustretum vulgare* Tx. 1952, *Salicetum albae* Ssler 1924 (Sanda et al, 1997); in the meadows of *Festuca pratensis* (fig. 1), *F. valesiaca*, *F. rubra*, *Poa pratensis*, *Anthoxanum odoratum*; in the ruderal vegetation of *Agropyron repens*, *Cicuta virosa*, *Sambucus ebulus*. Also *Rosa canina* characterize alliances Berberidion Br.-Bl. 1950 (*Prunio spinosae* Soó (1930) n.n 1940).



**Fig. 1 Rosa canina in the Festucetum pratensis Soó (1938) 1955, 1969 plant community**

## CONCLUSIONS

The variation of the studied characters may be due to several factors, including the altitude and plant communities that are found in populations of *Rosa canina*. The plant communities examined with *Rosa canina* are divided into the following groups: forestry, shrublands, grasslands and ruderal.

The high variability observed in this area indicates the possibility of selection of new genotypes to be used in species breeding process.

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