



Study of Some Growth and Fruiting Characteristics of *Rosa canina* in Some Locations in the Countryside of Jableh-Latakia-Syria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This research was carried out in 2023 in four sites of Jableh countryside belonging to Latakia Governorate, namely in Bchile, Halabko, Al-Munizla and Bashraghi in order to identify some of the growth and fruiting characteristics of Rose Canina. The height of the Bush, the length, width and

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area of the Leaf, the productivity of the Bush from the fruits, with the average weight of the fruit and its content of vitamin C, carotenoids, phenolic compounds and titratable acidity were studied, the average number of seeds in the fruit was also studied. He used the analysis of complete randomness and analysis of variance with Duncan's test to show the significance of the differences between the averages of the sites. The results of the analysis of the variance showed that the trees in the Bashraghi site were the highest in terms of height, while the lowest tree height was in the Halabko site, and there were no significant differences in the leaf area between the sites, and the Bashraghi site exceeded in the productivity of the Bush (4.2 kg.plant⁻¹) on the Halabko and Al-Munizla sites, while there were no significant differences in the average weight of the fruit, or its vitamin C content, as well as no significant differences in the content of fruits of carotenoids or total phenols and titratable acidity. As for the number of seeds in the fruit, the fruits of the trees of the Bchile site contained the largest number of seeds and the lowest was in the Al-Munizla site. It is advisable to take advantage of the fruits of the considered species for their richness in antioxidants and protection within their natural habitat.

Keywords: Rose; carotenoids; type; acidity; vitamin C.

1. INTRODUCTION

Rosa canina belongs to *Rosa* genus, and *Rosaceae* family, which includes more than 100 species distributed in Europe, Asia, the Middle East, Africa, and North America [1]. It is a wild shrub spread in the Mediterranean basin, Europe, northwest Africa, and western Asia [2]. The plant grows mostly in natural habitats in mountains, forests and meadows, and its fruits are harvested, processed and marketed, as they have distinctive chemical properties, especially the high content of vitamin C, salts and active compounds, and therefore the raw fruits are important in the food and pharmaceutical industries [3].

The nasturtium is characterized as an erect shrub or climbing plant, and it is a perennial plant that can reach a height of 3.5 meters, and its root is very deep, and the branches of the nasturtium are densely organized. The trunk and branches are curved backwards, and most species are thorny, and the thorns are hook-shaped. The leaves are about 3 cm long, and they consist of 5.7 leaflets and usually have serrated edges. The leaves are oval and usually bluish or pale green. Flowers are solitary or clustered in 2-15 clusters. The fruits of *Rosa canina* are round or oval, 1-3 cm long, of the pseudotype [4], they ripen in August to September [5] and are brick-red to dark red in color when Maturity [6].

This species is resistant to harsh environmental conditions such as rocky and sloping terrain, poor soil, and water shortages. It is a plant that can grow in a wide range of altitudes from 30-2500 m, especially on rocky slopes in forest openings. Thanks to its deep and spreading

roots and its broad crown, it increases the soil's water-holding capacity, prevents soil erosion, and provides a habitat for other plants and animals [7].

Fresh rosehips are consumed as a snack and dried rosehips are processed and used in products such as tea, marmalade, jam, etc., while the seeds, which are by-products of rosehip products, are used in animal feed. The fatty part of rosehip seeds contains more than 50% polyunsaturated fatty acids. Rosehip seed oil has been used in cosmetics due to its therapeutic effect on skin disorders. Rosehip has preventive and therapeutic efficacy against colds, infectious diseases, gastrointestinal disorders, urinary tract diseases and inflammatory diseases [2].

The fruits of the plant are considered a good source of phenolic compounds such as tannins, flavonoids, phenolic acids, anthocyanins and others. In addition, the fruits are the richest source of the L isomer of vitamin C among fruits and vegetables, as the content of the fruit's ranges from 300 - 4000 mg.100 g⁻¹ [8].

A study [9] showed that plant fruits are considered one of the most important plant species in terms of their antioxidant content. The fruits also contain 0.038% orange essential oils, 11% pectin, 10.0-13.7% invert sugar, 0.6-2.4% sucrose, 2.0-2.7% tannin, 2.4% ash and 22.8-38.0% water [10].

Many studies have been conducted around the world on the rose of narcissus, and most of them focused on the chemical content of the fruits. In a study in Turkey, a great diversity was found in

the genetic models of narcissus, as the average weight of its fruits ranged between 2.28-3.29 g, the percentage of soluble solids ranged between 18.87 and 21.28%, and the content of vitamin C ranged between 507 and 621 mg\100 g [11]. The average fruit weight of the models studied by [5] in Turkey also ranged between 0.88 and 2.22 g, the number of seeds between 11 and 35.33 seeds/fruit, while the soluble solids ranged between 22 and 40.32%, the total acidity between 1.5 and 3.5% based on citric acid, and the total sugars between 12.02 and 21.28 g\100 g. In terms of nutrients in the fruits, it was found that the most abundant elements in the fruits of the osprey in Croatia are potassium, calcium, magnesium and phosphorus, whether in wild or cultivated shrubs. Among the trace elements, the highest percentage was iron, aluminum and manganese. These percentages varied between the studied models, and the researchers recommended their importance as an important genetic resource that can be used to obtain compounds of great benefit to human health [12].

Rosa Canina is a plant species of high nutritional and medicinal importance that has not received sufficient local studies. The dangers that threaten wild species in Syria are no secret, starting with fires, logging, and the expansion of agricultural land at the expense of wild species. Therefore, it is necessary to survey the presence and spread of this species and identify the chemical properties of its fruits in order to benefit from them in the food and medical industries, instead of preserving this species in its habitats and creating genetic complexes for it. The study aims to identify some of the quantitative and qualitative characteristics of narcissus rose bushes and fruits that are naturally present in several locations in the Jableh countryside in Lattakia Governorate in Syria.

2. MATERIALS AND METHODS

2.1 Study Area Description

Field tours were conducted and the areas of spread of *Rosa canina* in Lattakia Governorate were identified, and then four sites were chosen in the Jableh countryside to be the site for implementing the research and collecting samples. The following Table 1 shows those sites and their specifications:

2.2 Plant Material

The plant material included osprey shrubs naturally distributed in the studied sites.

2.3 Research Methods

Three shrubs were selected from each site, so that they were healthy and free from diseases, insects or mechanical damage. The following was studied on each shrub:

Tree height (m): It was measured in linear meters from the soil surface to the highest point of the crown.

Leaf specifications: A sample of 100 leaves was taken from each shrub from the middle of the branches so that they were free from pathogens, insects and mechanical damage. The average length and width of the leaf were studied using a ruler, and its area was measured using the weight method.

Fruit weight (g) and shrub productivity (kg\shrub): By harvesting the fruits when they are ripe and weighing them to calculate productivity, and taking a sample of 100 fruits and weighing them to calculate the average fruit weight.

Table 1. Some geographical and climatic data for sample collection sites

Location	Rainfall rate (mm\year)	The coordinates of the site	Height above sea level (m)
Bchile	781	35.29°N 36.15°E	1100
Halabko	726	35.34°N 36.16°E	1139
Al-Munizla	778.7	35.33° N 36.19°E	1185
Basharagi	720.9	35.3°N 36.1°E	775

Number of seeds in the fruit from the sample that was used to measure the average fruit weight.

Vitamin C content (mg\100g): The titration was performed using 2,6-dichlorophenol indophenol dye according to [13] where the ability of vitamin C to reduce the blue dye to a colorless compound was relied upon, and the amount of vitamin in the solution was calculated according to the amount of dye consumed in the titration.

Titrationable acidity: A sufficient number of fresh fruits was taken, mashed, filtered and then titrated with an alkaline solution (NaOH: 0.1N) in the presence of phenolphthalein reagent based on the dominant acid, which is malic acid.

Total carotenoids: Samples of known weight of green local Rosa leaves from 5 plants in each experimental plot were crushed in pure acetone and then the light absorption of the extract was measured using a Spectrophotometer at a wavelength of 470 nm, and then the total pigment content was estimated relative to the fresh weight of the leaves (micrograms\g wet weight) according to [14].

Total phenolic compounds: Total polyphenols were estimated using the Folin-Ciocalteu method with some modifications according to [15]. The principle of the method is based on the reduction of the components of the detector by phenolic hydroxyl groups to form a blue product in a basic medium. 100 g of the fleshy part of the fruits were crushed in 1 ml of high-purity ethyl alcohol, then 200 µl of the extract was taken and 1 ml of Folin's reagent diluted 10 times was added to it. The tubes were shaken and kept at laboratory temperature for 4 minutes, then 800 µl of sodium carbonate solution (75 g\l) was added to them, and kept at laboratory temperature for 2 hours. The optical absorption was measured at 750 nm using a Spectrophotometer and the content of

polyphenols was estimated by a standard curve using gallic acid (16-20 mg\l).

2.4 Statistical Analysis

The experiment was designed according to a completely randomized design, and each site was considered a treatment. Three shrubs were selected from each site, so that each shrub was considered a replicate. The data were subjected to analysis of variance (ANOVA) and then Duncan's test at a significance level of 0.05%.

3. RESULTS AND DISCUSSION

3.1 Shrub Height and Leaf Specifications

The study site affected the height of the shrub (m), as Table 2 shows that the highest height of the *Rosa canina* shrubs was in the Bashragi site (1.77m), surpassing the Halabko site, which showed the lowest height of the shrub (1.2m), while the other sites gave average values between them, and the average height of the *Rosa canina* shrub in the various sites was 1.44m. These results do not agree with the results of [7], as the researchers did not find an effect of the site on the height of the shrub, and the height of the shrubs in their study in several sites in Turkey ranged between 0.9 and 1.2m, meaning that they are shorter than the trees in the current study sites, and this can be attributed to the difference in genetic models or the difference in the age of the shrubs and the environmental conditions in which they live.

As for leaf length, significant variation was found among the different sites, and the Bashragi site gave the largest average leaf length (4.17 cm), surpassing the Halabko and Al-Munizla sites (3.1 and 2.2 cm, respectively), while no significant differences appeared between the Bashragi and Bchile sites. On the other hand, the site did not affect the leaf width or area, and the average leaf width for the sites was 2.22 cm and the average area was 5.78 cm².

Table 2. The effect of the site on the height of the *Rosa canina* shrub (m), leaf length (cm), width (cm), and area (cm²) for several sites in the Jableh countryside

Location	Leaf area (cm ²)	leaf width (cm)	leaf length (cm)	Shrub height (m)
Bchile	3.44 a	2.1 a	3.7 ab	1.43 ab
Halabko	3.68 a	2.33 a	3.1 b	1.20 b
Al-Munizla	5.17 a	2.33 a	2.2 c	1.37 ab
Bashragi	5.78 a	2.13 a	4.17 a	1.77 a
Mean	4.52	2.22	3.29	1.44

Table 3. Effect of four locations on the productivity of sagebrush (kg\bush)

The site	Production (kg\bush)
Bashragi	3.33a
Halabko	1.7b
Al-Munizla	1.2b
Bchile	3.7a
Mean	2.7

Table 4. Effect of site on average fruit weight (g) and average number of seeds per fruit (seed\fruit) for nasrin fruits

Location	number of seeds per fruit (seed\fruit)	fruit weight (g)
Bchile	27.0 a	3.95 a
Halabko	21.2 ab	3.47 a
Al-Munizla	14.6 b	3.5 a
Basharagi	21.9 ab	3.73 a
Mean	21.18	3.67

Table 5. Effect of location on titratable acidity (%), vitamin C (mg\100g fresh weight), total polyphenols (mg gallic equivalent\100g fresh weight) and total carotenoids (mg\100g fresh weight) of the narcissus fruits

Location	Total carotenoids (mg\100g fresh weight)	Total polyphenols (mg gallic acid\100g fresh weight)	Vitamin C (mg\100g fresh weight)	Titratable acidity (%)
Bchile	9.77 a	447.0 a	583.3 a	1.80 a
Halabko	9.53 a	474.0 a	582.3 a	2.17 a
Al-Munizla	11.2 a	492.0 a	539.7 a	2.03 a
Basharagi	8.83 a	505.3 a	571.7 a	2.00 a
Mean	9.83	479.6	569.3	2.00

3.2 Production and Average Fruit Weight

The results showed that the highest fruit production per bush was in the Bchile site (3.7 kg\bush), followed by the Bashragi site (3.33 kg\bush) without any significant differences between them, and the productivity of the two sites outperformed the productivity of the bushes in the Al-Munizla sites (2.1 kg\bush) and Halabko (1.7 kg\bush), which did not show any significant differences (Table 3).

Table 4 shows that there was no effect of the study site on the average fruit weight, which ranged between 3.47 g in Halabko site and 3.95 g in Bchile site. It is worth noting that the average fruit weight in the various studied sites is greater than the values obtained by many researchers such as [5] where it ranged between 0.88 and 2.22 g in Turkey, and 1.6 and 1.9 in Croatia [12].

The study site had a significant effect on the seed content of the fruits, as the site in Bchile

gave the highest number of seeds in the fruits (27 seeds\fruit) surpassing the site in Al-Munizla (14.6 seeds\fruit), while the rest of the sites gave average values between these two sites.

These results are consistent with the results of [5], as the average number of seeds in the fruits ranged between 11 and 30.23 seeds\fruit.

3.3 Chemical Specifications of the Fruits

Table 5 shows that the site did not affect the acidity of the nasrin fruits, which reached an average of 2%. These results are consistent with the results of [5], who found that the total acidity in the fruits of many Rosa genotypes ranged between 1.51 and 3.5%, but with significant differences between the genotypes.

The results showed that the fruits of the narcissus are very rich in vitamin C, the percentage of which was not affected by the location and ranged between 539.7 mg\100g in

Al-Munizla and 583.3 mg\100g in Bchile, and the overall average content of the fruits of the vitamin was 569.3 mg\100g fresh weight. These results are consistent with the results of [11] who showed that the fruits of the narcissus rose are rich in vitamin C, the percentage of which differed significantly between the studied types and ranged between 507 and 621 mg\100g.

As for the content of polyphenols, it was not affected by the study site and ranged between 447 and 505.3 mg gallic acid\100 g fresh weight in the sites of Bchile and Basharagi, respectively. These results are not consistent with the results of [16] in Turkey, as it was found that the content of polyphenols in fruits is affected by the studied type, and all the studied types gave higher values than those obtained in our study and ranged between 1018 and 1407 mg gallic acid equivalent\100 g fresh weight. These differences may be due to the variability of the studied genotypes with the reference studies. The content of total carotenoids in fruits ranged between 8.83 and 11.2 mg\100 g fresh weight in the sites of Basharagi and Al-Munizla, respectively, and no significant differences were found between the different sites. These results are consistent with the results of [11], as his study of a group of hyacinth rose varieties in Turkey showed that the total carotenoids content of the fruits ranged between 6.59 and 13.12 mg\100 g.

4. CONCLUSIONS

The location affected the height of the hyacinth bushes and the length of the leaf, while it did not affect the leaf area. The location in Bchile and Basharagi gave the highest average productivity. (kg\bush), and the location did not affect the average weight of the fruit. The location did not affect the acidity of the fruits and the content of vitamin C, polyphenols, and carotenoids. The study recommends in-depth study of the chemical and morphological composition of the plant's fruits. The necessity of working to multiply the plant and increase its numbers and spread in the areas where it is found In order to benefit from the chemical and medicinal properties of its fruits.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image

generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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