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Morphological Characterization of Some Nisreen Roses (*Rosa canina*) Types Scattered in Some Mountainous Areas in the Countryside of Jableh, 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

The research was carried out in four sites in the mountains of Jableh area, which is affiliated with Latakia Governorate, Syria (Bchile, Halabkou, Bshraghi, and Manizala), with the aim of performing a Morphology description of some types of *Rosa canina*. Trees were taken from each site and each tree was considered a type, and 35 traits related to the vegetative total, flowers and fruits. Cluster analysis was used to determine the degree of kinship based on the characteristics of the vegetative group, the flowers and the fruits separately, and then all the characteristics combined. The study found a difference in the characteristics of the vegetative total, and the specifications of the fruits. There were no differences in the specifications of the studied flowers, whether between the types of the same site or between the sites. All the studied types had single flowers in light pink color, and the diameter of the flower was small and the shape of the flower chair was spherical. All the types studied had thorns on the branches that differed in their density and size, and the overall cluster analysis showed that the types within the same location were closest to each other compared to the rest of the sites, especially the types of the site of Bshraghi. We recommend taking care of this species and protecting it in its natural habitats, and creating gene pools for distinct types.

Keywords: Morphological characterization; Rosa canina; flower; cluster analysis; types.

1. INTRODUCTION

The genus of *Rosa* has attracted considerable attention from taxonomists and many species have been described. At present, there are about 100-250 species of this genus. Many of these species are now thought to have originated by hybridization, often accompanied by polyploidy. In addition, widespread human influence has led to the development of many new semi-wild and/or cultivated rose varieties. Traditionally, many indicators are used to characterize species of this genus and are divided into quantity and quality Such as the characteristics of shape, size, and color of petals, sepals, the structure of the flower, the length of the flower neck and the presence or absence of glandular hairs, the shape and size of leaves, leaflets, and their serrations [1]. After environmental conditions change, changes in morphological characteristics can occur from the size of entire plants to the size of individual leaves, buds, flowers, and fruits. Studies suggest that morphological indicators are a valuable tool in the field of forest management and land management after the agroforestry process, as they give important indicators directly related to growth, physiological and environmental changes [2].

Many researchers have used morphological characterization of many plant species in order to identify and formulate phenotypes, and this included many wild and cultivated species. Al-Hajjar et al [3] used morphological characterization to study the variations in many types of pistachios "*Pistacia vera*" in Suwaidi. Assadi and Moufeed [4] used it in Iraq to study the phenotypic diversity of some varieties of sidr "*Ziziphus* spp". Deebet al [5] used it to characterize wild types of apples "*Malus trilobata* (lab)" spread in the mountains of the Jableh area, and it was also used to characterize many wild olive types spread in Masyaf from the countryside of Hama Governorate in Syria [6].

Nassour et al [7] used 28 phenotypic traits in distinguishing between types of shami and wild roses. Some phenotypic variations, such as the density of thorns, the shape of the flower, the color of the leaves and the shape of the fruit, were able to distinguish between the types of roses, which gave the largest difference rate of up to 40%, depending on the cluster analysis. It was found that there was a very low variation between types that follow the same species, especially in those that are in the same area. These differences in their upper limits did not exceed 7% [7-10].

The importance of the research stems from the importance of *rose canina* plant, which is one of the important plant species found in coastal mountainous areas, and has not received a good amount of attention or study to the extent that is commensurate with its environmental and nutritional importance and its role in biodiversity. Therefore, this study comes to cover the gaps in reference studies on this species, and to establish a morphological identity for the species spread in the mountains of the Jableh region.

2. MATERIALS AND METHODS

2.1 Study Area Description

Four areas of natural spread of *Rosa canina* have been selected and are shown in the Table (1) and Fig. 1.

The following map shows the locations of the stusied sites in Jableh area:

2.2 Data Collection

Three types were selected from each area, and the necessary readings were made on the shrubs, and samples were taken for laboratory study. Types are coded as follows:

Table 1. The studied sites and their height above sea level (m) and their coordinates

Location	Altitude (m)	The Site
Bchile	1100	35.29°N 36.15°E
Halabco	1139	35.34°N 36.16°E
Manizala	1185	35.33°N 36.19°E
Bshraghi	775	35.3°N 36.1°E

Within each selected plant type in each region, a set of traits was studied that included 20 traits related to the vegetative total, 10 traits about the productivity and specifications of fruits and seeds, and 5 traits related to the flower, as follows:

- **Characteristics of the vegetative system:**

1. Shrub height (m).
2. The shape of the crown of the bush (standing - spread - sagging).
3. The presence of thorns on the branches (present - absent).
4. The abundance of thorns on the steam (few, medium, many, too many).
5. The size of the thorns (small - medium - large).
6. Steam texture (smooth - rough).
7. The shape of the stem section (circular - polygonal).
8. The average number of sheets per sheet (from a sample of 20 sheets taken from the middle of the branches).
9. The average length of the leaflet (cm).
10. Average leaf width (cm).
11. Average leaf area (cm^2): Calculated by weight method.
12. Top leaf color.
13. The presence of operas on the top surface of the leaf.
14. Type of leaflet teething.
15. The shape of the leaflet (length/ width).
16. The shape of the top of the leaflet.
17. The shape of the leaflet base.
18. Weight of leaflet (g).
19. Peripheral leaf teething.
20. The presence of abnormalities on the underside of the leaf.

- **Productivity and fruit and seed recipes:**

1. Average plant yield (kg/tree).
2. Average fruit weight (g).
3. The color of the fruits when ripe.
4. The length of the fruit's neck.
5. Average fruit length (cm).
6. The average diameter of the fruit.
7. The presence of thorns on the fruits
8. The average number of seeds in a fruit.
9. The presence of hairs on the seeds.
10. Color of ripe seeds.

- **Floral Specifications:**

1. Flower Color
2. Flower type (single-duplex)
3. Flower diameter.
4. The shape of the flower chair.
5. Number of petals.

2.3 Data Analysis

Cluster analysis of vegetative, fruit, and flower traits was carried out to determine the degree of kinship between the studied types. The software Xlstat was used to perform the cluster analysis.

Table 2. The names and symbols of the types studied plants

S.N	Type Name	Type
1	Bchile 1	R1. B
2	Bchile 2	R2. B
3	Bchile 3	R3.B
4	Halabco 1	R4. H
5	Halabco 2	R5.H
6	Halabco 3	R6.H
7	Bshraghi 1	R7.BG
8	Bshraghi 2	R8.BG
9	Bshraghi 3	R9.BG
10	Manizala 1	R10.M
11	Manizala 2	R11.M
12	Manizala 3	R12.M

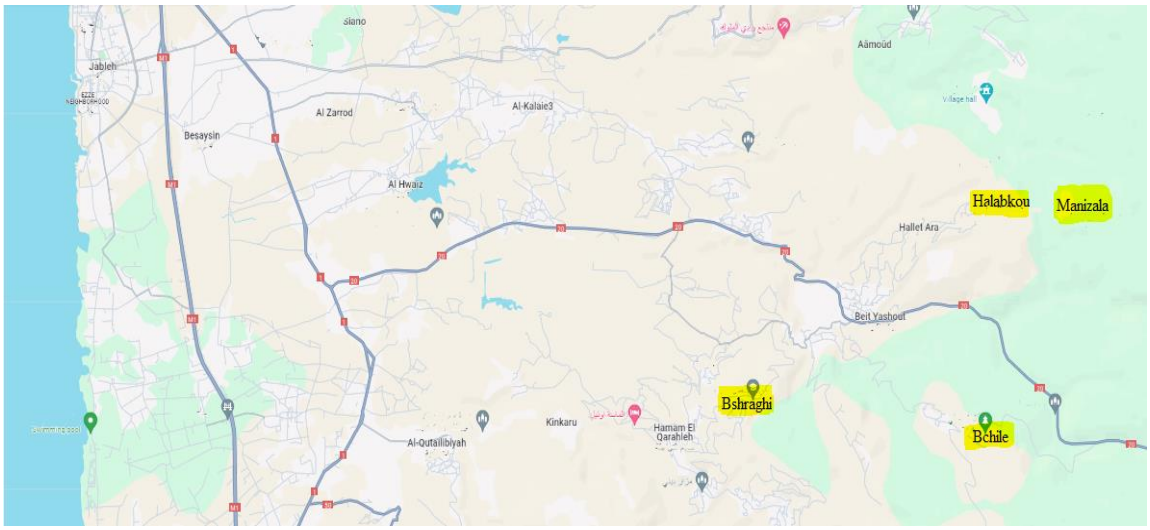

Fig. 1. A map of Jableh area showing the studied sites (marked in yellow)

3. RESULTS AND DISCUSSION

To illustrate the results, the adjectives that carry numerical data were displayed in a table and those that carry qualitative data in a separate table.

3.1 Vegetative Total Specifications

Table 3 shows that the height of the shrubs ranged from 1.1 m to 2.1 m with an average of 1.4m for all types, while the average number of leaflets per leaf ranged from 3-7 leaflets, and an average of 4.8 leaflets. A difference emerged with regard to the average length of the leaflet, which ranged from 1.8 in the type 8 in Bshraghi and 4.2 in the type 1 in Bchile and both types 8 and 9 in Bshraghi and an average width of 3.3 cm. The width of the leaf ranged from 1.8 cm in the types 7 and 8 in Bshraghi and 2.5 in the types Halabco 6 and Manzalah 11. The Manizala type gave 11 the highest average leaf area (7.78 cm^2) while the lowest was in the Halabco 5 type (2.73 cm^2), and the differences in the average leaf weight were small.

Table 3. The height of the shrub, the number of leaflets, its length, width and area, and the weight of the leaflets for the *Rosa canina* types studied in four locations in the mountains of Jableh area

Type	Shrub Height (m)	Average Number of Leaflets Per Leaf	The Average Length of the Leaflet (cm)	The Average Width of the Leaflet is (cm)	Average Leaf Area (cm^2)	The Weight of the Leaflet in (g)
R1. B	1.4	5	4.2	2.1	4.2	0.118
R2. B	1.2	5	2.8	1.9	3.04	0.11
R3.B	1.7	3	4.1	2.3	3.07	0.113
R4. H	1.1	5	2.8	2.4	4.06	0.112
R5.H	1.2	5	2.7	2.1	2.73	0.119
R6.H	1.3	5	3.8	2.5	4.25	0.11
R7.BG	2.1	7	4.1	1.8	4.13	0.111
R8.BG	1.5	5	4.2	1.8	4.735	0.116
R9.BG	1.7	5	4.2	2.8	6.65	0.115
R10.M	1.2	5	1.9	2.3	654	0.113
R11.M	1.4	3	1.8	2.5	7.78	0.119
R12.M	1.5	5	9.2	2.2	9.2	0.112
Mean	1.4	4.8	3.3	2.2	4.5	0.11

Table 4. The shape of the crown of the bush, the presence of thorns on the branches, the abundance of thorns on the stem, its size, and the steam texture of *Rosa canina* patterns studied in 4 locations in the mountains of Jableh area

Type	Shrub Crown Shape	The Presence of Spines on the Branches	The Abundance of Spines on the Stem	Size of Spines	Stem Texture
R1.B	Slouchy	Present	Medium	small	Straight
R2. B	Slouchy	Present	Medium	small	Straight
R3. B	Slouchy	Present	Medium	small	Straight
R4. H	Slouchy	Present	too many	Big	Rough
R5.H	Slouchy	Present	too many	Big	Rough
R6.H	Slouchy	Present.	too many	Big	Rough
R7.BG	existing	Present	Few	small	Straight
R8.BG	existing	Present	Few	small	Straight
R9.BG	existing	Present	Few	small	Straight
R10.M	Slouchy	Present	Medium	Big	Straight
R11.M	Slouchy	Present	Medium	Big	Straight
R12.M	Slouchy	Present	Medium	Big	Straight

The growth strength of the shrubs in the studied sites is greater than the growth strength of the types studied [11]. The height of the shrubs in their study in several sites in Turkey was between 0.9 and 1.2m; that is, they are shorter than trees in the current study sites, and this can be attributed to different genotypes or different age of the shrubs and the conditions of the environment in which they live. The types differed in the density and size of the thorns, which is one of the distinctive characteristics between the sites.

[12] documented the division of the types he studied from the eagles into 11 thorny types, 35 medium thorns, and only 4 types with few thorns. In general, thorniness is a negative trait, especially when it comes to harvesting fruits or breeding processes [11].

Table (4) shows that there are few differences in the shape of the crown. It is sagging in all types of the site in Bchile, Halabco, and Manzilah, while it is standing in types in Bshraghi; all types have thorns on the branches, and the density of those thorns is medium in types in Bchile and Manzilah, while the thorns are very many in types of Halabco and few in Bshraghi; as for the size of the thorns, they are small in types in Bchile and Bshraghi, and large in types of Halabco and Manzilah; and as for the texture of the steam, it is smooth in all types except for types of the site of Halabco, the texture of the steam is rough.

As for the rest of the characteristics of the vegetative total, there were no differences between the types within the site or between the sites. The shape of the stem section was circular, and the color of the upper surface of the leaves was light green, with no pubes either on the upper or lower surface, and the leaf has an elongated oval shape, with serrated teething and end leaf teething, a double serrated, and the top of the leaf is slightly tapered and the shape of the base of the leaf is rounded.

Cluster analysis (Fig. 2) indicates that the studied *Rosa canina* types split into two major groups. The main group (y) included the Manezilla models (R10.M, R11.M), while the group (X) included the rest of the studied models with a difference rate of more than (86%).Where clear phenotypic differences were recorded between the two previous groups in many vegetative qualities, the most important of which are the height of the bush , the shape of the bush crown, the abundance of thorns on the stem, the size of thorns, the average number of leaflets per leaf, the average length of the leaflet cm, the average area of the leaflet.

Group (X) also divided into two groups with a difference of 43%.

3.2 Specifications of Fruits and Seeds

The studied models varied in their fruit production, and the least productive models were R5.H, R6.H, R12.M (1.5 kg/bush), while the highest producing model was R2.B (4.1 kg/tree). The average for all models was 2.71 kg/shrub (Table 5). As for the average fruit weight, it was similar in different locations and for different

types, and averaged 3.7 g. The R8.BG model gave the highest fruit neck length (4.1 cm), while the R11.M model gave the shortest fruit neck length (1.2 cm). Regarding fruit measurements, fruit length ranged between 1.63 cm in models R10.M & R11.M and 2.4 cm in models R1.M & R9.BG; The diameter of the fruit was similar between the models, reaching an average of 1.24 cm. It is worth noting that the average weight of the fruit in the various studied sites is greater than the values obtained by many researchers such as Türkben et al [13], which ranged between 0.88 and2.22 g in Turkey, and 1.6 and 1.9 in Croatia [11].

The fruits of the various types contained a large number of seeds ranging from 16.42 seeds/fruit in the R11.M type and 3.5 seed/ fruit in type R2.B It averaged 22.1 seeds/ fruit. These results are consistent with the results of Türkben et al [13]. The average number of seeds in the fruits was between 11 and30.23 seeds/fruit (Table 5).

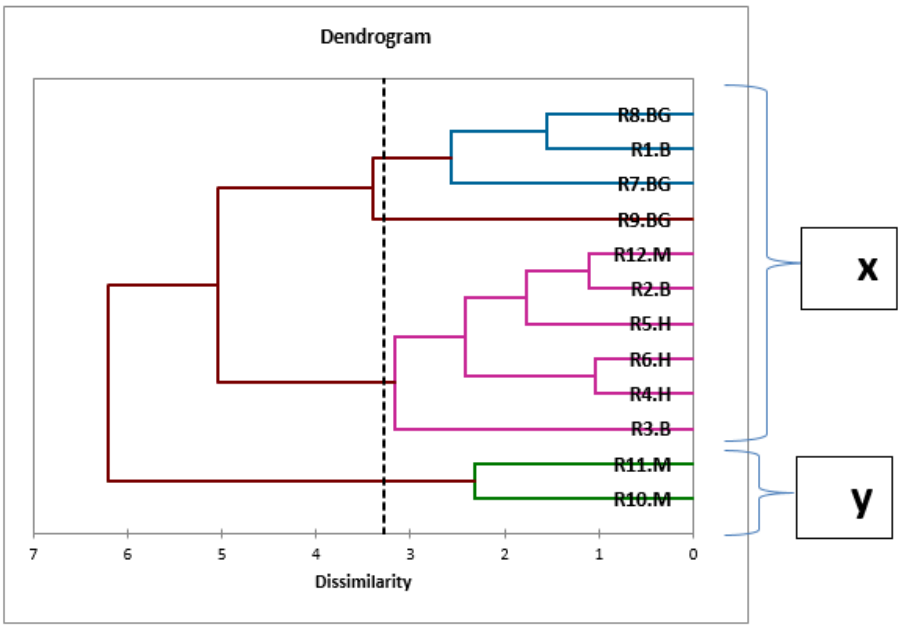

Fig. 2. The kinship tree depending on the specifications of the vegetative total of the studied *Rosa canina* patterns

Table 5. Fruit and seed specifications of the *Rosa canina* types studied in 4 locations in the mountains of the Jableh region

Type	Average Bush Yield (kg)	Average Fruit Weight of the Bush (g)	Fruit Neck Length (cm)	Average Fruit Length (cm)	Average Fruit Diameter (cm)	Average Number of Seeds (Seed/Fruit)
R1.B	3.5	4.05	3.6	2.4	1.34	30.2
R2 B	4.1	3.7	3.4	2.8	1.18	30.5
R3B	3.5	4.1	2.1	2.3	1.05	20.32
R4 H	2.1	3.3	2.3	2.1	1.33	20.64
R5H	1.5	3.6	2.3	1.9	1.35	20.5
R6H	1.5	3.5	2.4	1.9	1.3	22.3
R7.BG	3.2	3.8	2.1	2.36	1.17	20.6
R8BG	3.3	3.6	4.1	2.36	1.19	22.3
R9BG	3.5	3.8	2.3	2.4	1.22	22.9
R10]No	2.5	3.5	1.2	1.63	1.22	18
R11No	2.3	3.9	1.6	1.63	1.1	16.42
R12No	1.5	3.1	2.3	1.9	1.43	20.45
Moderate	2.71	3.67	2.5	2.14	1.24	22.1

For intermodal kinship, cluster analysis (Fig. 3) refers to the splitting of the studied *Rosa canina* types into two main groups (y) The main group (R1) included Bchilean types.R2 B), while Group (X) included the rest of the studied types with a difference of more than (87%). There were clear phenotypic differences between the two previous groups in several characteristics, the most important of which are: the average yield of the bush, the average weight of the fruit from the bush, the length of the neck of the fruit, the average length of the fruit, the average diameter of the fruit, and the average number of seeds. Also, the group (X) divided into two groups with a difference of 12.5%.

3.3 Specifications of the Pink Total

There was no diversity in the specifications of the studied flowers, whether between the types of the same site or between the sites. All the studied types had single flowers in light pink color, and the diameter of the flower was small and the shape of the flower chair was spherical.

These results do not correspond to the results of Nassour et al [7], which found a discrepancy in the color of wild rose flowers between white and pink. This indicates that the types studied are genetically close to each other, especially that the characteristics of flowers are important in distinguishing between species.

3.4 Overall Phenotypic Qualities

We combined all 35 traits studied, and studied the kinship between the types. The cluster analysis (Fig. 5) revealed that the studied rose eagle models were divided into two main groups. The main group (y) included the Bashragi models (R7.BG, R8.BG, R9.BG), while the X group included the rest of the studied types with a difference of more than 80%. There were clear phenotypic differences between the two previous groups in many characteristics, the most important of which are: the height of the bush (m), the shape of the bush crown, the abundance of thorns on the stem, the size of thorns, the average number of leaflets per leaf, the average length of the leaflet, the average area of the leaflet, the average yield of the bush, the length of the neck of the fruit, the average number of seeds. Group (X) also divided into two groups with a difference of 12%.

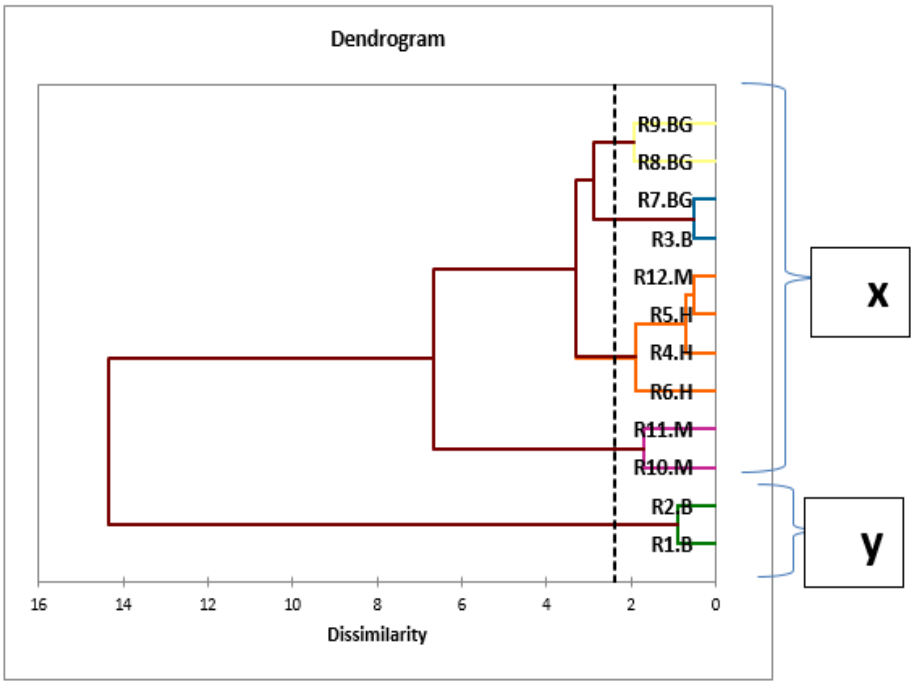

Fig. 3. The kinship tree depending on the specifications of the fruits and the role of the studied *Rosa canina* patterns

Fig. 4. flowers, seeds and fruits of *Rosa cania* in Bashragi

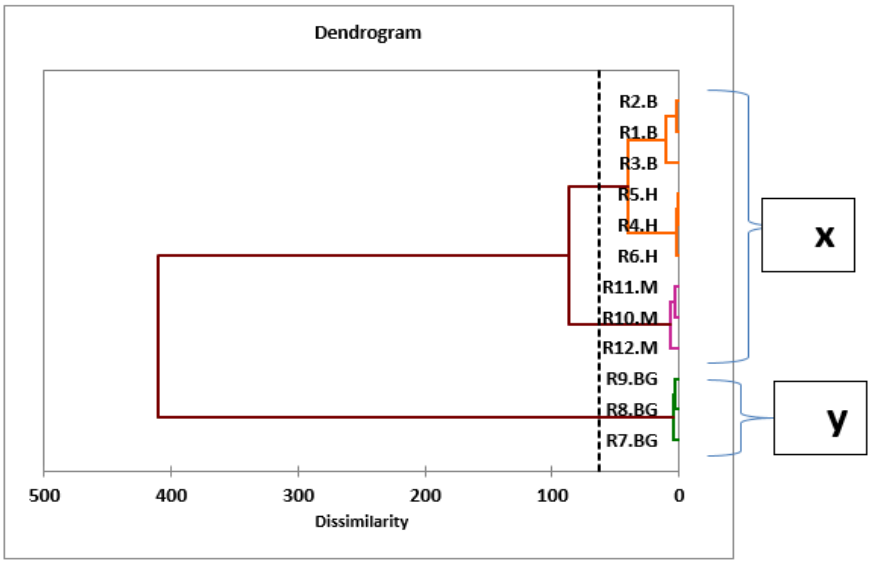

Fig. 5. The kinship tree depending on the overall appearance specifications of the studied rose *Rosa canina* patterns

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

- The patterns of the studied Nisreen rose flowers were similar in the characteristics of the leaflet weight and the presence of thorns on the branches. All the patterns were similar in the specifications of the studied flowers, which indicates that it is not possible to differentiate between them based on these characteristics.

- The similarity between single-site types has emerged significantly, making it difficult to differentiate between them based on the qualities studied, especially with a great impact on the environment.
- The weight of the fruits of the studied types is greater than the weight of the fruits of the reference types, which gives them relative importance.
- A morphological identity has been established for the studied types, but further qualities should be studied in order to distinguish between the studied types.

4.2 Recommendations

- In-depth study using other Morphology indicators, as well as chemical and molecular indicators.
- Conducting studies related to the chemical content of fruits to determine the possibility of benefiting from them in nutrition.
- Election of distinguished types and the work of an inheritance complex for them in order to benefit from them in breeding and propagation programs.
- Preserve the rose of the Nisreen in its natural habitats.

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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