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The Diversity Centers and Ecological Characteristics of *Rosa* L. (Rosaceae) Taxa in Türkiye

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Abstract

This study was carried out between the years 2006-2009 on wild *Rosa* L. taxa of Türkiye. Important localities for the genus *Rosa* in Türkiye, soil, rock and vegetation characteristics of these localities and their taxon numbers were identified and classified. Important localities and the centers of diversity of the *Rosa* taxa present naturally in Türkiye are: Dedegöl, Kaçkar, Sultan mountains, Tosya Ilgaz mountain Pass, Zigana Pass, and Böğrüdelik Pass. Natural *Rosa* taxa growth is poor up to 600 m of altitude and at altitudes higher than 2000 m, but they are strongly distributed between 1000 and 2000 m. They prefer the sunny and southern slopes, with sandy soils having drainage, and on limestone and conglomerate rocks. Most of the roses in the country are of Mediterranean elements, and the Irano-Turanian elements come in second row. The presentations include the numerical values of the study.

Keywords: *Rosa*, Phytogeography, Diversity, Ecology, Important Areas.

INTRODUCTION

Despite its small dimensions, Türkiye is considered one of the major centers for plant biodiversity in the world. Türkiye's natural environment is very diverse, its climate ranging from subtropical to cold temperate (Nilsson, 1972). This ecological diversity has contributed not only to a high genetic diversity, but has also allowed the successful introduction and cultivation of a great number of plant taxa (Nilsson, 1972). The richness of Turkish Flora is an important source for plants with different utilizations (Nilsson, 1972).

Türkiye is known as a gene center of many economic plants (Korkmaz and Özçelik, 2011). Türkiye is an important country for the production and trading of medicinal and aromatic plants. The Lake Region (Göller Yöresi), especially the city Isparta, is one of the most crucial centers for medicinal and aromatic production. Owing to the floristic studies on the flora of Isparta, it

was discovered that a total of 2280 distinct plant taxa are existing in the area; 190 of them were of high medicinal, aromatic and essence rich value and 160 of them were of high spice value (Özçelik and Serdaroğlu, 2000). Today, 300 different types of volatile oil from various species are traded around the world and the trade targets a 1-billion-dollar market with a production of 50 thousand tons (Başer *et al.*, 1990). Many species of the families cultivated in the Turkish flora, especially of *Lamiaceae* and *Rosaceae*, are widely used in many fields such as perfume, food flavoring, as spices, in medicine and in beverages (Başer *et al.*, 1990). It is in the regions around the Mediterranean where the most members of these families commonly exist.

Türkiye is one of the most important Rose germplasm centers. About 25 % of all rose species are native to the country. Flowers of some rose species, such as *Rosa gallica*, *R. centifolia* and *R. damascena* have been used for rose oil and rose water production in Anatolia for a long time. The rose hip fruits of some other species have economic value and are also used for medicinal purposes (Ercişli, 2005).

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In order to protect the biodiversity, Türkiye has acceded to a large number of environmental agreements. It is through industrial sector and tourism that the biodiversity can be preserved. It is vital that the species which have a prominent place in the world market and are likely to be economically cultivated in Türkiye should be systematically shifted to industry-oriented agriculture and primarily introduced to markets in the form of processed products. In this context, this study was conducted so as to determine such species among the taxa of *Rosa* L. – being especially important- which exist in Türkiye and to discover their ecological and economical characteristics. There are around 20 factories in Türkiye which process roses. They are generally located in Isparta and their main purpose is the production of rose oil essence.

Many plant species are used for different applications such as food, pharmaceutical raw material, and wood. The wild and transitional forms of many cultivated plants in the country form a variety of genetic resources (Kültür, 1998).

These plants are usually from the branches at the basal and very often constitute a cover. And most importantly, they are very durable against extreme environmental conditions. Therefore it has an important place in the prevention of erosion (Yayla, 2003).

A review of the literature yielded that foreign scientists have rarely conducted serious studies on diversity centers of roses. The Netherlands is the leading country in the production of cut flowers and modern roses. Although they have up to a thousand varieties or specimens, they are comprised of just a few species.

To obtain new varieties with high genetic potentials, the most common techniques used in plant breeding are recombination, mutation and hybridization across species. However, these techniques are very costly as well as requiring a long time. Therefore, Türkiye is the intersection point of the gene centers; these desired features of rich plant resources are of great importance for the selection of genotypes (Çelik, 2007).

Usually, in terms of climate and soil types, roses are not too selective on their preferences. Therefore in Anatolia, these plants exist at altitudes up to 3000 m in various soil types (Ercişli and Güleriyüz, 2005).

Roses grow naturally in the Central and the Western Asia, Caucasus, Europe, the Northwestern Africa, Iraq, the northern and the western sections of Iran, in the north of Afghanistan and Pakistan-Kashmir (Aghamirov and Farzaliev, 2005).

Roses can be found at an altitude up to 2200 m in Central Asia, and in Anatolia, Iran, Iraq, Afghanistan and Pakistan, may grow in altitudes up to 2500 m - 2900 m (Kutbay and Kılıç, 1996).

In Türkiye, many studies have been carried out on roses, especially on its industry so far. The primary objectives of our study are the following: to determine how many species of roses exist in Türkiye; to present the distinctive characteristics of roses; to categorize roses for economical purposes and to discover their

habitats, hybridization centers and centers for genetic diversity. This research includes informations on the important centers of diversity for natural roses in Türkiye, which is only a small portion of the present study, including data on the importance of the particular taxa, the size of the area, the number of species or taxa present in that area, its vegetation and its ecological characteristics.

MATERIALS AND METHODS

The material of our study is the roses taxa growing naturally in Türkiye. Between 2006 and 2009, approximately 3000 rose specimens were collected from the mountainous areas of Türkiye with the aim of comprehending their systematic, ecological and economical characteristics. Following the process of diagnosis (Özçelik, 2010; 2013) all the specimens were converted into valuable materials in accordance with the herbarium techniques and were placed in the Herbarium GUL (in Department of Biology at Süleyman Demirel University). The domain of the study is the whole of Türkiye. The study determined the localities with great diversity, due to their richness in species, hybrids, ecotypes and forms. Afterwards, for each locality the coordinates and the altitudes were determined by using GPS. The study also focused on such issues as the size of the area, its importance to the diversity of roses, the parent rocks present, the gradient of the land, the names of the roses growing throughout the area, the possibility of utilizing the roses in an economical manner and the vegetation prevalent across the area. Fifteen areas established to be significant for roses all around Türkiye are presented in order of importance. The study described the important areas of Türkiye for roses as well as setting forth comparisons and comparative discussions between the localities in order to emphasize the importance of the area when necessary. The vegetation of some of these localities either was not studied or was studied by another researchers, in these case being mentioned in reference to their particular studies.

RESULTS

Important Natural Areas of Roses in Türkiye

Locality 1: Isparta: Yenisarbademli, in and around Mount Dedegöl

Coordinate and Altitude: N: 37°41'175, E: 031°17'881, R: 1300-2700 m

Locality Characteristics: The locality is the most important gene center of the natural roses in Türkiye. The lower parts and cleared spaces of *Pinus nigra* Arn. (black pine) forest, stream beds and mountainous (alpinic) zones are important habitats for roses. At

altitudes between 1300 and 1800 m, the diversity of species and the richness in form are particularly great. The fact that the locality is under protection has been an important factor in the formation and preservation of the diversity. Sütçüler: Around the Plateau Sanlı - Plateau Sarıçiçek and Mount Tota, almost 20 ecotypes of *R. canina* were detected. Since this area is also an important diversity center of *R. dumalis*, a great deal of hybridization occurs between the two species. Similarly, a considerable number of hybrid forms between *R. canina* and *R. gallica* as well as between *R. villosa* and *R. hirtissima* can be observed. It is especially an important center of hybridization for *R. heckeliana*. The area is of particular importance to *R. canina*, *R. dumalis*, *R. pulverulenta* and *R. hirtissima*.

A total of 12 *Rosa* taxa can be naturally found in the area. These taxa are as follows: *R. dumalis* Bechst., *R. canina* L., *R. heckeliana* Tratt., *R. pulverulenta* M.Bieb., *R. horrida* Fischer, *R. gallica* L., *R. villosa* L., *R. hirtissima* Lonacz., *R. tomentosa* Smith, *R. micrantha* Sm., *R. sicula* Tratt., *R. phoenicia* Boiss.

The ecotypes of the species have not been included in the count. Among the reasons for this richness are the formation of vegetation, the diversity of the rocks and the microclimatic characteristics. The vegetation across the area is dominated by *Pinus nigra* Arn., while *Juniperus excelsa* L. can be found in a pure or complex manner in the upper parts. These forests are sometimes accompanied by *Cedrus libani* A. Rich. (cedar). The largest number of *Rosa* taxa is cultivated in cleared spaces in the forest and on rocky hillsides with high altitudes. The parent rock is of limestone and chalk structures.

Locality 2: Trabzon-Rize: Kaçkar Mountains

Coordinate and Altitude: N: 40°34'194-40°54'469, E: 040°24'310-041°10'141, R: 1100-1815 (-2500) m.

Locality Characteristics: The locality is the second most important gene center in Türkiye for the genus. Subalpin and alpine belts (especially between 1815-2500 m.) are very important habitats of the mountain. *Rosa villosa* L., *R. montana* Chaix, *R. elymaitica* Boiss., *R. pulverulenta* M. Bieb. and *R. dumalis* Bechst grow very well across the locality. It is an important hybridization center for *R. heckeliana* subsp. *heckeliana* x *pulverulenta* as well as for *R. dumalis* subsp. *boissieri* x *canina* and *R. montana* x *dumalis* mentioned in Flora of Turkey and the East Aegean Islands (Davis, 1972).

In total, 10 rose species grow in the locality. These species are as follows: *Rosa hirtissima* Lonacz, *R. villosa* L., *R. elymaitica* Boiss. & Hausskn, *R. tomentosa* Smith, *R. montana* Chaix, *R. canina* L., *R. dumalis* Bechst., *R. heckeliana* Tratt. and *R. pulverulenta* M. Bieb., *R. foetida* J. Herrm. Their ecotypes have not been included in the count. Among the important habitats of rose are the alpine strips in upper parts of Uzungöl, wet grasslands and opened places of *Pinus sylvestris* L. (yellow pine). At altitudes between 1300 and 2000 m, the diversity of the species and the richness in

form are particularly great. Similarly, the upper parts of the plateau Ayder are interesting and favorable environments for some rose species. The vegetation of these areas is the typical eastern Black Sea forest, cleared spaces and of the alpine belt characteristics. Considering that roses are sensitive to excessive water and low-altitude environments (between 1100-1500 m), it is thought-provoking how the area is an important center. On the other hand, the fact that the habitats there have decent drainage, the high altitude and the cold climate eliminates the negative aspects of the locality for roses.

Fagus orientalis Lipsky and *Picea orientalis* (L.) Link. are dominant throughout the area.

Crucial woody plants of the area in discussion are as follows: *Abies nordmanniana* (Stev.) Spach, *Pinus sylvestris* L., *Taxus baccata* L., *Ulmus glabra* Hudson, *Acer* L. spp., *Alnus glutinosa* (L.) Gaertner, *Tilia rubra* DC., *Ostrya carpinifolia* Scop., *Carpinus betulus* L., *Buxus sempervirens* L., *Rhododendron* L. spp., *Quercus* L. spp., *Betula medwediewii* Regel, *Ulmus minor* Miller., *Rhamnus imeretinus* Booth., *Sorbus torminalis* (L.) Crantz, *Berberis crataegina* DC., *Acer tataricum* L., *Rhamnus pallasii* Fisch. & C.A.Mey., *Daphne pontica* L., *Crataegus monogyna* Jacq., *Cotoneaster morulus* Pojark. and *Daphne glomerata* Lam. according to importance row.

Notable herbaceous plants of the area are as follows: *Helleborus orientalis* Lam., *Papaver lateritium* Koch., *Lilium monadelphum* M.Bieb., *Astragalus aureus* Willd., *Acantholimon libanoticum* Boiss., *Salvia cryptantha* Montbret & Aucher ex Benth., *Morina persica* L., *Convolvulus cantabrica* L., *Saponaria picta* Boiss., *Hypericum pruniatum* Boiss. & Bal. and *Viola odorata* L. Above 1900 m, a sub-alpine grassland which enjoys quite a rich vegetation exists. There are a number of herbaceous plant taxa in the area. Among these are: *Ballota nigra* L., *Stachys sylvatica* L., *Stachys macrantha* (C. Koch.) Stearn, *Pedicularis condensata* M.Bieb., *Aster caucasicus* Willd., *Alchemilla orthotricha* Rothm., *Trifolium pannonicum* Jacq., *Aquilegia olympica* Boiss., *Lilium monadelphum* M.Bieb., *Veratrum olbelfanum* Bernh. and *Anemone narcissiflora* L. according to importance row.

Locality 3: Between İskilip (Çorum)-Tosya (Kastamonu): The Tosya Ilgaz Pass

Coordinate and Altitude: N: 40°56'326, E: 034°12'257, R: 1400-1650 m.

Locality Characteristics: The area is the third largest gene center for Roses in Türkiye. The region around Amasya-Çorum-Turhal is rich in roses. Roses are able to grow very well at altitudes between 1400 and 1650 m. The fact that the area is a mountain with a high gradient increases its importance, too. It is the hybridization center of *R. dumalis* subsp. *boissieri* x *canina* and *R. dumalis* subsp. *boissieri* x *montana* subsp. *woronowi* and *R. canina* x *dumalis*. A total of 9 rose species grow throughout the area. These species are as follows: *R. heckeliana* Tratt., *R. montana* Chaix subsp. *woronowii*

(Lonacz.) Ö.Nilsson, *R. tomentosa* Smith, *R. jundzillii* Besser, *R. sicula* Tratt., *R. horrida* Fischer, *R. canina* L., *R. dumalis* Bechst. and *R. foetida* J. Herrm. Their ecotypes have not been included in the count. The locality enjoys an abundant amount of iron deposits. Its typical soil is of terra rossa type. The main rock is generally Hematite. Its vegetation consists of *Pinus sylvestris* L., cleared spaces and at its upper parts the alpine zone vegetation. The locality is dominated by *Juniperus oxycedrus* L. subsp. *oxycedrus*.

Locality 4:

a: Around Torul (Gümüşhane): The pass Zigana

Coordinate and Altitude: N: 40°39'355, E: 039°24'019, R: 1700-2400 m.

b: Torul: Around the villages Kopuz (Güzeloluk), Dağdibi, Arpalı, Altınpınar

Coordinate and Altitude: N: 40°30'437, E: 039°07'382, R: 2181 m

Locality characteristics: there is a diversity of species and these rose species are rich in forms. Roses are highly widespread at altitudes between 1400 and 2000 m. Gümüşhane have a great diversity of roses and especially in the species whose fruits can be utilized in the industry. The region around the mountain pass Zigana is an important hybridization center for natural roses. The mountainous villages and the mountains of the district Torul are important centers for old garden roses and natural roses, respectively. The localities in Gumushane which have the greatest number of rose species are found around Torul and the mount Zigana. The diversity of the species is reflected in both natural and local old garden roses. Furthermore, the area which has a high altitude is rich in wild roses. The village Altınpınar has the same altitude as Torul or some 50 m higher than it. The number of wild roses are no less than 10 for both groups. Nevertheless, the number of studies conducted so far is too limited to give a precise figure.

Altitudes between 1000 and 1800 ensure favorable conditions for roses to grow in Türkiye. But higher altitudes are required for this in Gümüşhane; at altitudes between 1700 and 2000 m roses can be found in large numbers and they are healthy. The vertical distribution of roses continues up to as high as 2400 m. Roses have been discovered to be in great numbers and very diverse at altitudes between 1000 and 1800 m but a few species also exist in lower and upper (2400 m) altitudes. As the altitude increases in eastward direction, this provides the optimum favorable conditions for roses to grow.

Seven taxa were discovered in the area. These taxa are *R. tomentosa* Smith, *R. canina* L., *R. iberica* Stev., *R. dumalis* Bechst., *R. heckeliana* Tratt., *R. hirtissima* Lonacz and *R. villosa* L. according to importance row.

Although the area is included within the boundaries of the Black Sea Region, it is situated on some kind of a pass between the Black Sea Region and the Eastern Anatolia. Zigana is a range of mountains separating the two regions. The altitude and atmospheric conditions are

various. Therefore, a microclimate is prevalent in the area. In any case, roses demand places with sandy soils and favorable drainages; however, they are not picky in terms of the diversity of rocks; however, the greatest variety of species has been observed in limestone and volcanic rocks. The roses are sensitive to surplus water. The vegetation at the moderate altitudes is generally composed of *Pinus sylvestris*, *Juniperus* forests and grasslands while the upper parts are occupied by mesophilous and alpine pastures. The main rocks in the locality are conglomerate, limestone and occasionally loose ground with a volcanic nature. The locality has important woody plants characterizing habitats such as *Berberis* L. spp., *Crataegus* L. spp., *Rubus ideus* L., *Cotoneaster* Medik. spp., *Daphne* L. spp. in the lower parts and in the cleared spaces of *Pinus sylvestris* L. forest. It is the hybridization center of *R. canina* x *pimpinellifolia* and it may also be the hybridization center of *R. dumalis* subsp. *boissieri* x *iberica*. Because, the area has all taxa mentioned above and abundance of them.

There are a number of old garden roses growing in the locality, too. Among them, *R. x damascena* growing at localities with high altitudes is a promising species for rose oil business. *R. damascena* is produced for domestic household requirements especially in the village Altınpınar.

Crucial lignous plants of the area are as follows: *Pinus sylvestris* L., *Juniperus oxycedrus* L. subsp. *oxycedrus*, *Cotoneaster nummularia* Fisch. & C.A.Mey., *Prunus divaricata* Ledeb., *Rhamnus* L. according to importance row.

There are a number of herbaceous plant taxa characterizing the area: *Astragalus aureus* Willd., *A. microcephalus* Willd., *A. lagurus* Willd., *A. dipodurus* Bunge, *Thymus praecox* Opiz, *T. pubescens* Boiss. & Kotschy ex Celak., *Cystopteris fragilis* (L.) Bernh., *Artemisia chamaemellifolia* Vill., *Senecio lorantii* Hochst., *Tanacetum mucroniferum* Hub.-Mor. & Grierson, *Helichrysum arenarium* (L.) Moench., *Hypericum scabrum* L., *Arenaria gypsophiloides* L., *Poa bulbosa* L., *Sideritis congesta* P.H. Davis & Hub.-Mor. according to importance row.

Locality 5: Afyonkarahisar-Isparta-Konya: Sultan Mountains

Coordinate and Altitude: N: 38°19'210, E: 031°27'015, R: 1075 m.

Locality characteristics: The area is an important diversification and hybridization center for natural roses. Until recently, the area was in need of serious preservation. In the near future, it might prove to be an even more important center for roses. Interesting roses grow on the pass between Yalvaç and Aksehir and in the parts of the highway between Isparta and Afyonkarahisar that are near Afyonkarahisar. The town Keciborlu-Kılıç: There are many forms of wild roses on the road from Isparta to Mamat Bridge. Throughout the area, roses are seen to be harmed by caterpillars to an

excessive limit.

Seven species of roses were detected in this locality. These are *R. foetida* J. Herrm., *R. pulverulenta* M.Bieb., *R. horrida* Fischer, *R. iberica* Stev, *R. canina* L., *R. dumalis* Bechst. and *R. hirtissima* Lonacz. according to importance row. Such diversity may be regarded as inadequate for an important center. Even so, it is a significant hybridization center among these species. The species are rich in form. Furthermore, the locality, which has a volcanic structure, is especially important in that it is able to preserve some species which have a limited habitat.

Crucial lignous plants characterizing the area are as follows: *Pinus sylvestris* L., *Juniperus oxycedrus* L. subsp. *oxycedrus*, *Quercus* L. spp., *Cotoneaster nummularia* Fisch. & C.A.Mey., *Prunus divaricata* Ledeb., *Sorbus torminalis* (L.) Crantz, *Crataegus monogyna* Jacq., *Jasminum fruticans* L., *Rhamnus* L., *Robinia pseudoacacia* L. (cultivated).

There are a number of herbaceous plant taxa in the area: *Bolanthus cherlerioides* (Bornrn.) Bark., *B. minuartioides* (Jaub. & Spach) Hub.Mor., *Sideritis congesta* P.H. Davis & Hub.-Mor., *Hypericum scabrum* L., *Astragalus aureus* Willd., *A. microcephalus* Willd., *A. dipodurus* Bunge, *Thymus praecox* Opiz, *T. pubescens* Boiss. & Kotschy ex Celak., *Sideritis congesta* P.H. Davis & Hub.-Mor., *Cystopteris fragilis* (L.) Bernh., *Artemisia chamaemellifolia* Vill., *Senecio lorentii* Hochst., *Silene supina* M.Bieb., *Tanacetum mucroniferum* Hub.-Mor. & Grierson, *Helichrysum arenarium* (L.) Moench, *H. plicatum* DC., *Arenaria gypsophiloides* L., *Poa bulbosa* L. according to importance row.

Locality 6:

a: Around Siran-Kelkit Valley; The pass Findikbeli and Cilhoroz: The highway between Alucra-Şiran-Şebinkarahisar (Gümüşhane).

Coordinate and Altitude: N: 40°16'888, E: 38°49'248, R: 1500-1700 m.

b: The pass between Gumushane-Sirvan (The pass Kosedag) and 12 km to Kelkit, 70 km to Gumüşhane. The highway between Gümüşhane-Şirvan, around 15 km to Şirvan.

Coordinate and Altitude: N: 40°08'640, E: 39°18'329, R: 1432 m.

c: Gümüşhane: Center, around Artabel; Arzular, Kabaköy, the village Dölek, the villages Artabel, Musalla, Gulaçar, Kelli and the surrounding mountains

d: The highway between Gümüşhane-Sirvan, 12 km, 70 km and ±15 km to Kelkit, Gümüşhane and Şirvan, respectively steppe.

Locality Characteristics: It is a diversity and hybridization center for natural roses. Wild roses are diverse in size, the form of growing, color and other characteristics. Although the species are not diverse, some of them (especially *R. canina*), are rich in form. Caterpillars impose a constant threat for the roses. Cause of this situation is being considered as climatic factors of the area. The fruits have a great deal of gall

nut; the sepals and the pedicles are generally glandular and hairy.

Five species were discovered in the locality: These are as follows according to importance row: *R. jundzillii* Besser, *R. canina* L., *R. dumalis* Bechst., *R. heckeliana* Tratt. and *R. hirtissima* Lonacz. Their ecotypes have not been studied.

The lower parts and the cleared spaces of *Pinus sylvestris* L. represent an important habitat. The locality is dominated by plants of steppe vegetation and the land is rich in sulfur. It has a volcanic character. Roses can grow in great numbers in erosive hillsides, metamorphic rocks and the lower parts and the cleared spaces of *Pinus sylvestris* L. The cleared spaces of forests encountered the formation of bush; the bushes of the Rosa species and other species have dominated the locality. In addition, the locality is on the slope and in the form of a cliff. This has led to the formation of various habitats.

Locality 7: The highway between Gürün-Sivas, nearly 30 km to Gürün, The pass Böğrüdelik and the upper parts,

Coordinate and Altitude: N: 38°57'331, E: 037°16'520, R: 1673-1900 m.

Locality Characteristics: The locality is an important differentiation center of *R. heckeliana* Tratt. The locality has limited surface area; its vegetation is of steppe character and is entirely comprised of limestone. The locality is overgrazed by nearby villagers. Plants have maintained their existence in rock valleys where animals are not grazed too much. The locality also contains *R. hirtissima* Lonacz.

Locality 8: Erzincan, Üzümlü: Mount Keşiş

Coordinate and Altitude: N: 39°45'104, E: 039°43'246, R: 1511-2600 m.

Locality characteristics: It is an important center of *R. pulverulenta* x *dumalis* subsp. *boissieri* and *R. gallica*. The locality is also dominated by other species (*R. dumalis*, *R. canina*, *R. villosa* etc.) which hybridize with *R. canina*. Despite clear implications for its importance, the area has not been studied in a detailed manner yet.

Five species were discovered in the locality. These are as follows according to importance row: *R. pulverulenta* Bieb., *R. dumalis* Bechst., *R. gallica* L., *R. canina* L. and *R. villosa* L.

The diversity of the ecotypes has not been examined. The water source for the district Üzümlü, the hill Aladag, the upper parts of Damlacık, Devrant, the hill Geduk and the surrounding places cover a vast area. The parent rock has a volcanic nature. The locality is covered by the steppe vegetation, the distinctive vegetation of the region. The lands are generally volcanic and situated on a steep slope.

Locality 9:

a: Konya: Around Hadim:

Coordinate and Altitude: N: 37°03'798, E: 032°28'482, R: 1060 m.

b: Bozkir, Yalihuuyuk: Around the town Alicerci and its

cemetery

Coordinate and Altitude: N: 37°15'412, E: 032°08'739, R: 1280 m

Locality Characteristics: The place around Hadim is an important center for cultivated and wild roses. Strong hybridizations are observed among natural roses growing in the mountainous area between the 10th km and the 15th km of the road between Konya and Hadim. *R. canina* and allied wild roses in Hadim produce full of fruits. The age and the nourishment status of the plant or the stem might be the reason why the same plant contains both small and huge fruits or both small and large spines (but the formation of various spines in one single plant is not taken into consideration in this respect). Whether the trunks are red or green is also a similar ecological factor. Flowers (fruits) may be isolated or included within a dichasium; the number of fruits in a plant may vary to 6 from 1. Hybridization or radiation might be linked with the reason why a fruit is ovoid or global.

According to importance row, four species were discovered in the locality: *R. foetida* J. Herrm., *R. iberica* Stev., *R. canina* L. and *R. dumalis* Bechst. No investigation has been conducted on the variation in the ecotypes.

Locality 10: Erzurum: Dumlu Mountains

Coordinate and Altitude: N: 40°08'930, E: 041°26'141, R: 2035 m.

Locality Characteristics: Though small, the strait at the crossroads of mountains, 25-35 km away from Erzurum, on the highway Tortum is an important diversity center for natural roses. One microclimate allied to Mediterranean is observed across the area. The area is the hybridization center of *R. dumalis* subsp. *boissieri* x *iberica*. Moreover, we observed that the roses growing there fructify a lot and they look healthy. Because, the area has all taxa mentioned above and abundance of them. *R. dumalis* of them is seen to be rich in the ecotype.

According to importance row, five species of natural rose were observed in the locality. *R. canina* L., *R. dumalis* Bechst., *R. hirtissima* Lonacz., *R. villosa* L., *R. heckeliana* Tratt. and *R. pimpinellifolia* L. More detailed studies on the area can reveal the existence of more species.

The flora and the vegetation that was prevalent in the area were explained by Behçet and Tatlı (1989).

Crucial ligneous plants characterized the area are as follows: *Pinus sylvestris* L., *Rosa pimpinellifolia* L., *Cotoneaster nummularia* Fisch. & C.A.Mey., *Prunus divaricata* Ledeb., *Salix cinerea* L.

There are a number of herbaceous plant taxa in the area: *Astragalus aureus* Willd., *A. microcephalus* Willd., *A. lagurus* Willd., *Thymus praecox* Opiz, *T. pubescens* Boiss. & Kotschy ex Celak., *Cystopteris fragilis* (L.) Bernh., *Artemisia chamaemellifolia* Vill., *Senecio lorentii* Hochst., *Tanacetum mucroniferum* Hub.-Mor. & Grierson, *Helichrysum arenarium* (L.) Moench, *Arenaria*

gypsophiloides L., *Poa bulbosa* L. according to importance row.

Locality 11: Around the town Seydim between Corum and Iskilip

Coordinate and Altitude: N: 40°43'813, E: 034°28'24, R: 709 m.

N: 40°34'299, E: 034°46'387, R: 1075 m.

Locality Characteristics: Wild roses have big populations and they fructify a lot. At altitudes between 800 and 1200 m, the wild roses are commonly found and their populations cover a vast area. The roses in this land might be of a different ecotype or produce a great many fruits owing to the habitat characteristics. Among the members of the same species, the leaves might be light or dark. They are skinny or oily; they do not fructify intensely and some of them are observed to have been exterminated to quite some extent by caterpillars. The edible ones do not fructify much; however, this is not the case for the inedible ones. Furthermore, there is a great amount of gall formation on nuts (on leaves, on stems and fruits). The locality is one of the hybridization centers of *R. canina* x *dumalis*. It is an important locality in order to obtain roses for the production of fruit juice.

The locality is slightly rugged and large. It consists of places near agricultural fields, streams and some other slightly rugged areas. The land has a volcanic and partially conglomerate character. It is dominated by the steppe vegetation and used for grazing by the surrounding villages.

Locality 12: Around Bolu-Zonguldak

Coordinate and Altitude: N: 41°11'208, E: 031°55'630, R: 746 m.

Locality Characteristics: This locality has not been studied in a very comprehensive way. The plateau Kirazlı houses various forms of *R. pulverulenta*. This is the most common species of rose in the area. Some of them may be a hybrid between *R. hirtissima* or *R. villosa*. They have not been examined in an adequate manner. Hybrid forms of *R. dumalis* x *canina* are quite common in the area. *R. horrida* is a species whose members do not display much variety, are not common and stand individually away from each other. The plateau Kirazlı is a wet plateau with a steppe character and located in the alpine stripe. Trailing roses (*R. villosa*, *R. hirtissima* and *R. pulverulenta*) can be commonly found at around 2200 m. The lower parts, up to 600 m from sea level, are dominated by such long ones as *R. canina*, *R. dumalis* and *R. horrida*. The place around the small lake near Yeniçağ appears to be a very favorable environment for the hybridization of *R. canina* x *dumalis*. It is possible that there is a microclimate here.

The locality area houses six species of rose. These are as follows: *R. canina* L., *R. dumalis* Bechst., *R. pulverulenta* Bieb., *R. horrida* Fischer, *R. villosa* L. and *R. hirtissima* Lonacz.

The dominant vegetation of the upper (above 1500 m) parts is alpine steppe whereas the lower parts are dominated by *Pinus sylvestris* forests and some

hydrophilous vegetation.

Locality 13: Around Artvin, Sarigöl-Yusufeli

Coordinate and Altitude: N: 40°58'097, E: 41°28'957, R: 951 m.

Locality Characteristics: This locality is from the hybridization centers of *R. dumalis*. However, enough observation was not conducted on the habitat.

Five species of rose were determined to exist in the locality. These are as follows: *R. hirtissima* Lonacz, *R. pimpinellifolia* L., *R. pulverulenta* Bieb., *R. canina* L. and *R. dumalis* Bechst. according to importance row.

While not enough study has been conducted on its flora and vegetation, the locality has been concluded to have microclimatic characteristics and is an important location for the roses. The locality is situated on the pass between Europe-Siberia and Iran-Turan. Artvin is involved in European-Siberia, Erzurum is in Irano-Turanian fitogeographic regions. The locality, because of found in the intersection point and near to the Kaçkar mountains, is an important hybridization center of roses.

Locality 14: Around Amasya

Coordinate and Altitude: N: 40°40'931, E: 035°54'183, R: 405 m.,

N: 40°40'080, E: 035°59'379, R.: 1270 m.

Locality Characteristics: In the route between Amasya-Çorum, particularly between Merzifon and Iskilip-Tosya, the species are particularly rich in fruit yield although the species are not in various forms. As far as their appearances are concerned, they are aromatic and excessively consumed by caterpillars. The locality specifically the hill Kırklar, and the villages Yassical and Direkli have been studied in a detailed way. The most interesting aspect of the locality is not its species but the fact that a small number of species are decisively richer in form and can produce more fruits when compared to those in other localities. This can be explained by a microclimatic characteristic. Another interesting feature of the locality is that the roses are rarely seen to have an illness. The route between Amasya and Çorum are full of wild roses which fructify a lot but rarely suffer from an illness. On the other hand, the area around Gumushane produces many fruits but these fruits get afflicted with diseases. As for Malatya, the area fructifies a lot; however, these fruits cannot be used for economic purposes since the formation of gall nut in fruits is at a high-level. The locality does not have a high altitude. The upper parts suffer from overgrazing and the roses are greatly damaged by the animals.

Five species of roses were discovered in the locality. These are as follows: *R. pimpinellifolia* L., *R. micrantha* Sm., *R. canina* L., *R. dumalis* Bechst. and *R. beggeriana* Schrenk. according to importance row. We were not able to find *R. beggeriana* ourselves. This species might be collected from gardens before and so finished in natural habitats.

Locality 15: Van, Mount Erek-Mount Çadır - Kavuşşahap Mountains and surrounding places,

Coordinate and Altitude: N: 38°22'108, E: 043°23'657, R: 2225 m.

Locality Characteristics: This is an important center for wild roses. Around the village Kevenli economically-cultivated natural roses are present. Five species of roses were determined in the area. These are as follows according to importance row: *R. foetida* J. Herrm., *R. canina* L., *R. dumalis* Bechst., *R. heckeliana* Trat and *R. pimpinellifolia* L.

The vegetation of the locality has a steppe character. The area is comprised of volcanic and, in part, conglomerate rocky places. Despite changing from one place to another, the gradient is averagely around 30 % and in the form of a cliff. The flora and the vegetation of the locality were studied by Özcelik (1987) and Özcelik and Babaç (1993).

DISCUSSION AND CONCLUSION

When compared with the European Flora (Tutin *et al.*, 1968), it the identification key of the rose species in the Turkish Flora (Davis, 1972) is to simplify and adapt from the European Flora to Türkiye by excluding some of the taxa and adding endemics. "European Flora" is more comprehensive and includes 47 species of rose. Twenty-four of these species were reported to exist also in Türkiye. For that reason, the remaining 23 were excluded from the inventory in a way to simplify it and to adapt it to the Turkish Flora. Hence it is impossible to provide a precise number for the rose species in Türkiye.

Europe is not as favorable for growing roses as Türkiye. Türkiye's plant diversity is equal to the one in the whole of Europe; however, the rose diversity is half as great as the one in Europe. Needless to say, this suggests the lack of studies on roses in Türkiye. For the time being, roses have been studied in the form of species, hybrids and varieties. Their types have not been determined as of yet. It is estimated that there are about 70 species in Türkiye when the garden roses are also included.

Out of the natural rose specimens taken from 784 different localities, the lowest altitude where roses grow is 5 m while the highest altitude is 2984 m. The mean altitude is 1450.26 m.

The Black Sea Region is a low-altitude and humid environment which has few species of wild roses. Natural roses are represented by the least number of varieties. Roses like loose, sandy and slightly acidic soil and prefer the kind of lands which are on the slope and enjoy decent drainage. The sorts of soil where they most commonly grow are red, sandy, clayish-peat, sandy-clay soil. They grow well in stream beds, nearby places and erosive hillsides. They are resistant to draught. Roots grew in a downward direction in loose grounds and in a parallel direction in hard soil. They grow well in stream beds, nearby places and erosive hillsides. They are

resistant to draught conditions. Cold environmental conditions in (1500-) 2000-3000 m altitudes increase the formation of fruits and rooting. Wide central core area (the central cylinder) and the narrow cortexes suggest that the plant grows fast and comes from a region with mild climatic conditions. As can be concluded from the narrow central cylinders and wide cortexes indicate that the plant comes from a cold region, has a low developmental speed and a deciduous character. However, those with wide core areas (central cylinders) are more short-lived and more likely to be bothered by insect larvae in stem.

It can be argued that there are a lot of important rose areas in Türkiye. The number of taxa of such areas, the plant hybridization, their intra-species variety and the economic importance of their roses were considered as the criteria. The important rose areas of Türkiye can be listed as the Mediterranean, Irano-Turanian and Euro-Siberian in the decreasing order of importance. The importance becomes even greater at the crossroads of and passess between these regions. However, it is interesting and surprising that Kaçkar Mountains, that are regarded as the second most important among the areas, are located in Europe-Siberian region. Further research is needed on this issue. Our lack of knowledge about the history and the area fragmentation prevents us from making any more comments.

No *R. sempervirens*, *R. micrantha*, *R. agrestis*, *R. sicula* and *R. horrida* have been observed in Iran-Turan region; no *R. pisiformis*, *R. beggeriana*, *R. jundzilli* in the Mediterranean and no *R. sempervirens*, *R. phoenicia* and *R. arvensis* in European-Siberia region.

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