



The determination of rare species and risk categories in Nebyan Mountain (Samsun/Turkey)

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Abstract

In this study, we aimed to determine rare species in Nebyan Mountain (Samsun/TURKEY). Samsun province has distinct ecological features because both oceanic and Mediterranean climate are seen. Therefore in the study area different vegetation types namely temperate forest, scrub, grassland and stream valley vegetation types are found, and Mediterranean enclaves constitute to the important part of the flora. 90 families, 331 genera and 611 species and taxa were determined in the study area. 19 rare species are found according to Red Data Book of Turkish Plants (Ekim, et al., 2000) and these taxa were evaluated according to the IUCN risk categories. The distribution of the threat categories was as follows: 15 taxa in LR (lc), 1 taxa in LR (nt), 1 taxa in LR (cd), 1 taxa in EN, 1 taxa in VU.

Key words: Central Black Sea, Nebyan mount, rare species, IUCN, enclave, vegetation

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Nebyan Dağı'nda (Samsun/TÜRKİYE) nadir türler ve risk kategorilerinin belirlenmesi

Özet

Bu çalışma Samsun ili Nebyan Dağı florasında bulunan nadir türlerin saptanması amacıyla gerçekleştirilmiştir. Samsun ili ekolojik yönden çeşitli özelliklere sahiptir. Bu çeşitliliğin en önemli sebeplerinden biri Orta Karadeniz Bölgesinde olmasına rağmen iklim özellikleri bakımından Akdeniz iklim tipine ait karakterlere sahip olmasıdır. Bu nedenle araştırma alanında orman, maki, çayır ve nemli dere vejetasyon tiplerinin bulunmasının yanında, Akdeniz enklavları da bulunmaktadır. Araştırmalar sonucunda çalışma alanında 90 familyaya ait 331 cins ve 611 tür ve tür altı takson belirlenmiştir. Bölgede Türkiye Bitkileri Kırmızı Kitabı'na göre (Ekim, et al., 2000) 19 nadir tür belirlenmiş ve bu taksonlar IUCN risk kategorilerine göre değerlendirilmiştir. Türkiye Bitkileri Kırmızı Kitabı'ndaki IUCN tehlike kategorilerine göre araştırma alanında yayılış gösteren 611 taksonun, 15 adedi LR (lc), 1 adedi LR (nt), 1 adedi LR (cd), 1 adedi EN, 1 adedi ise VU kategorisine dahildir.

Anahtar kelimeler: Orta Karadeniz, Nebyan dağı, nadir türler, IUCN, enklav, vejetasyon

1. Introduction

Turkey have three different floristic regions namely Euro-Siberian, Mediterranean and Irano-Turanien and distinct attributes with respect to geographical location, geomorphological structure, and climate types. As a result of all these features, Turkey is different from neighboring countries from botanical point of view. Turkey has a rich flora in the temperature zone, with approximately 10,000 vascular plants (Sağiroğlu and Duman, 2011).

The study area ("Nebyan Mountain"), has oceanic climate. However, Mediterranean climate is also seen in western part and especially along Kızılırmak valley. The study area is located in Euxine province of Euro-Siberian floristic region. Furthermore, the vegetation of Nebyan Mountain appears to significant differences in terms of altitude,

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aspect, topography, temperature and precipitation depending on the ecological and geographical factors. Therefore, the study area have different vegetation types namely forest, maquis and stream valley vegetation (Kutbay and Kılınc, 1995a; Kutbay and Sürmen, 2013).

Nebyan Mountain is selected for this study because of having a particular flora and vegetation. The study area include typical Euro-Siberian species and including many Mediterranean enclaves, has a great potential for eco-tourism, road works and abiotic factors. However, the flora of the study area is subject to environmental damage due to tourism activities, overgrazing, land use patterns and agricultural activities (Karaer, et al., 2011). Nowadays, Nebyan Mountain has been visited by native and alien tourists for eco-tourism and other tourism activities, mountain tourism, photo-safari, and etc. Owing to these reasons, endemic and rare plants in the area were determined and risk categories of these plants were evaluated to contribute sustainable use of the area and develop protection strategies.

2. Materials and methods

The study area is located in A5-A6 squares according to the grid system of Davis and is called **Nebyan Mountain** (Samsun/Bafra) (Figure 1). It is surrounded by rich water resources, the most important one is Kızılırmak. The oldest geological structure unit is the upper cretaceous flysch series, volcanic and alluvial series are also present. The common soil groups are brown forest soils; grey-brown podsollic soils, alluvial and colluvial series (Kutbay, et al., 1995b).

The vegetation of the study area has been classified and eleven plant associations have been determined belonging to three vegetation types (Kutbay and Kılınc, 1995a; Kutbay and Sürmen, 2011). These associations and vegetation types are given in following Table 1.

Table 1. Vegetation types and plant associations. ("A" codes for associations)

| Vegetation types | Plant associations |
|-----------------------------|---|
| Macquis vegetation | <i>Carpino orientalis - Phillyretum latifoliae</i> Quézel et al., 1980 (A1) |
| Macquis vegetation | <i>Phillyreo latifolia - Lauretum nobilis</i> Quézel et al., 1980 (A2) |
| Forest vegetation | <i>Carpino orientalis - Quercetum cerridis</i> Kutbay & Kılınc 1995 (A3) |
| Forest vegetation | <i>Carpino orientalis - Fagetum orientalis</i> Akman et al., 1983 (A4) |
| Forest vegetation | <i>Fago orientalis - Abietum nordmannianae</i> Akman, 1976 (A5) |
| Forest vegetation | <i>Fago orientalis - Castanetum sativae</i> Quézel et al., 1980 (A6) |
| Forest vegetation | <i>Rhododendro luteo - Fagetum orientalis</i> Kutbay & Kılınc 1995 (A7) |
| Forest vegetation | <i>Daphno ponticae - Pinetum sylvestris</i> Akman, 1974 (A8) |
| Forest vegetation | <i>Genisto tinctoriae - Pinetum nigrae</i> Kutbay & Kılınc 1995 (A9) |
| Forest vegetation | <i>Quercu infectoriae - Pinetum brutiae</i> Kutbay & Kılınc 1995 (A10) |
| Moisture valley vegetations | <i>Salici albae - Platanetum orientalis</i> Kutbay&Kılınc 1995 (A11) |

The mean temperature of the coldest month (February) in the area is 6.9 °C, whereas the hottest month is (August) has a mean daily temperature of 28.2 °C. The hottest month is November (38.4 °C), while the coldest month is March (-7.0 °C). Mean annual precipitation is 691.70 mm. The study area is situated in Euxine province of Euro-Siberian phytogeographical region. 1125 plant samples were collected in the study area. Plant taxa were determined followed Davis et al. (1965-1985), Davis et al. (1988), Güner et al. (2000) and Kutbay et al. (1995b). The risk groups of species were also determined according to IUCN categories (Figure 2). Moreover 155 sampling plots were taken, and cover-abundance of species was estimated according to Braun-Blanquet vegetation classification method (Mueller-Dumbois and Ellenberg, 1974).

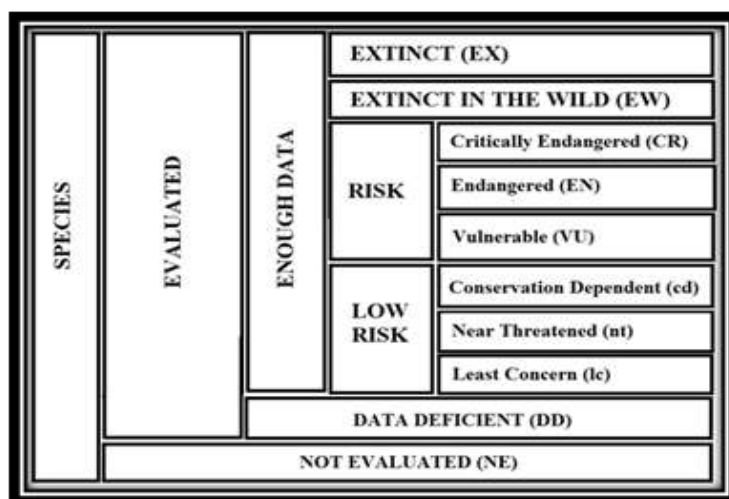


Figure 2. IUCN risk categories

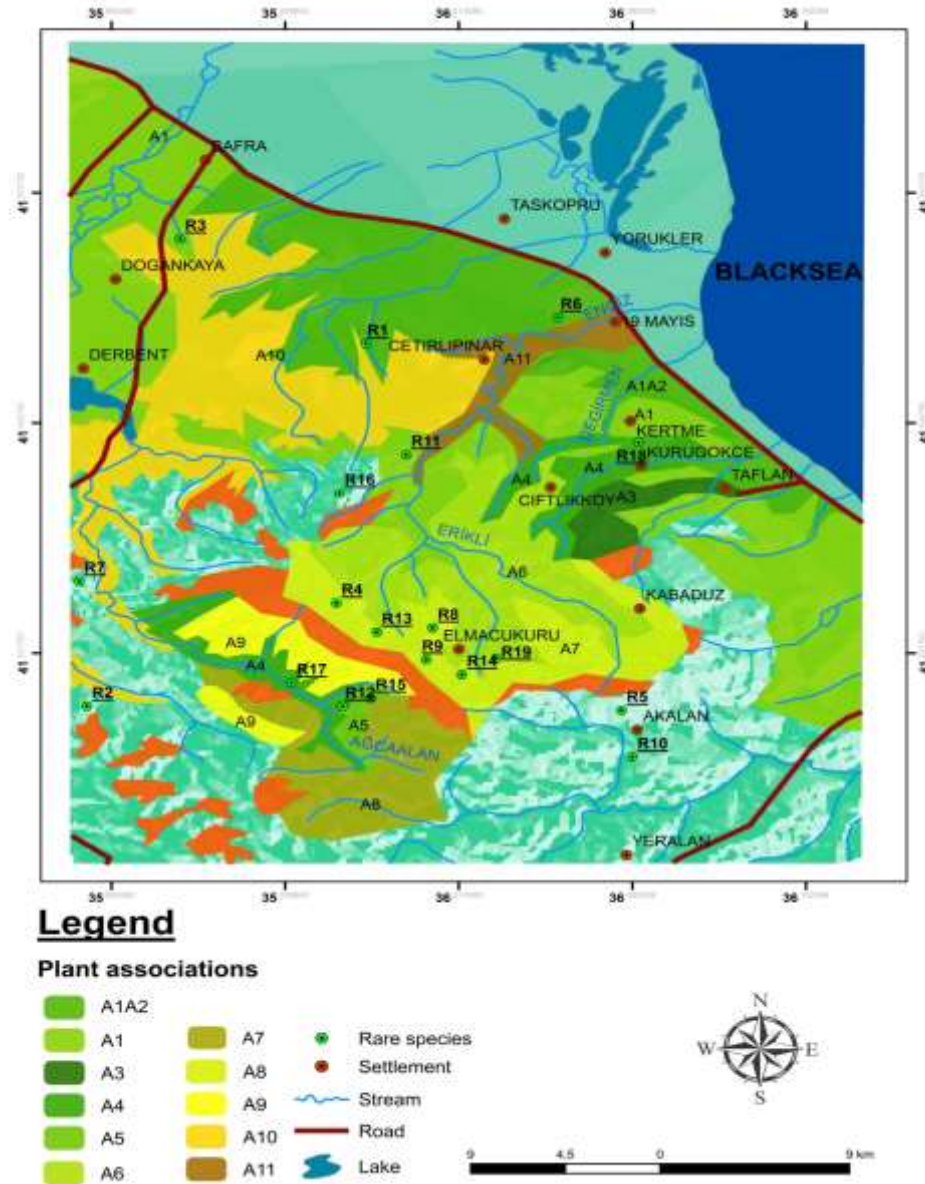


Figure 1. Map of Nebyan Mount. "A" and "R" codes for plant associations and rare species, respectively

3. Results

In the study area, 611 species were identified belonging to 90 families and 331 genus. According to Red Data Book of Turkish Plants (Ekim, et al., 2000), 19 rare species were identified and evaluated according to the IUCN categories of risk. As a result 15 taxa in LR (ic), 1 taxa in LR (nt), 1 taxa in LR (cd), 1 taxa in EN, 1 taxa in VU category (Table 2). *Arum euxinum* R. Mill has 1% cover-abundance in three sampling plots (Total sample plot area=2700 m²) and it is found in *Fago orientalis* - *Castanetum sativae* Quézel et al., 1980. *Cirsium pseudopersonata* Boiss. & Bal. subsp. *pseudopersonata* has 1% cover-abundance in 13 sampling plots (Total sample plot area=11000 m²) and it is found in three plant associations. They are *Carpino orientalis* - *Quercetum cerridis* Kutbay & Kılınç 1995, *Carpino orientalis* - *Fagetum orientalis* Akman et al., 1983, *Fago orientalis* - *Abietum nordmannianae* Akman, 1976, *Fago orientalis* - *Castanetum sativae* Quézel et al., 1980. *Cirsium poluninii* Davis & Parris is only found in one sampling plot (Total sample plot area=900 m²) with 1% cover-abundance and it is found one plant association (*Fago orientalis* - *Castanetum sativae* Quézel et al., 1980). *Trifolium pannonicum* Jacq. subsp. *elongatum* (Wild.) Zoh. has 3% cover-abundance (Total sample plot area= 1200 m²) and belonging to *Carpino orientalis* - *Phillyretum latifoliae* Quézel et al., 1980 and *Quercus infectoria* - *Pinetum brutiae* Kutbay & Kılınç 1995 (Table 3). Other rare species are represented by a single individual in different localities. The localities of rare species are given in table 4. All rare species and plant associations are showed in figure 1.

Table 2. Risk categories of determined species in Nebyan Mount. ("R" codes for rare species)

| Family | Species | IUCN red list categories |
|------------------|--|--------------------------|
| Malvaceae | <i>Alcea apterocarpa</i> (Fenzl) Boiss. (R1) | LR(Ic) |
| Linaceae | <i>Linum flavum</i> L. subsp. <i>scabrinerve</i> (Davis) Davis (R2) | LR(Ic) |
| Geraniaceae | <i>Geranium asphodeloides</i> Burm. Fil. Subsp. <i>sintensisii</i> (Freyn) Davis (R3) | LR(Ic) |
| Geraniaceae | <i>Geranium cinereum</i> Cav. subsp. <i>subcaulescens</i> (L'Herit. Ex DC.) Hayek var. <i>ponticum</i> (R4) | LR(Ic) |
| Fabaceae | <i>Genista aucheri</i> Boiss. (R5) | LR(Ic) |
| Fabaceae | <i>Lathyrus czechottianus</i> Bassler (R6) | LR(Ic) |
| Fabaceae | <i>Trifolium pannonicum</i> Jacq. subsp. <i>elongatum</i> (Wild.) Zoh. (R7) | LR(Ic) |
| Asteraceae | <i>Cirsium poluninii</i> Davis & Parris (R8) | VU |
| Asteraceae | <i>Cirsium pseudopersonata</i> Boiss. & Bal. Subsp. <i>pseudopersonata</i> (R9) | LR(Ic) |
| Asteraceae | <i>Centaurea consanguinea</i> DC. (R10) | LR(Ic) |
| Asteraceae | <i>Hieracium lasiochaetum</i> (Bornm. & Zahn) Sell & West (R11) | LR(Ic) |
| Boraginaceae | <i>Symphytum bornmuelleri</i> Bucknall (R12) | LR(Ic) |
| Scrophulariaceae | <i>Veronica multifida</i> L. (R13) | LR(Ic) |
| Lamiaceae | <i>Lamium gundelsheimeri</i> C. Koch (R14) | LR(Ic) |
| Rubiaceae | <i>Galium margaceum</i> Ehrend & Schönbr (R15) | LR(Ic) |
| Araceae | <i>Arum euxinum</i> R. Mill (R16) | LR(Ic) |
| Poaceae | <i>Festuca cyllenica</i> Boiss. Et Heldr. subsp. <i>uluana</i> Markgr.-Dannenb. (R17) | LR(nt) |
| Poaceae | <i>Festuca pontica</i> (E. Alexeevex) Marlgr. Dannenb. (R18) | EN |
| Poaceae | <i>Festuca paphlagonica</i> (St.-Yves) Markgr.-Dannenb. subsp. <i>paphlagonica</i> (St.-Yves) Markgr.-Dannenb. (R18) | LR(cd) |

Table 3. Population area size of selected rare species.

| | Approximate population area size |
|--|----------------------------------|
| <i>Arum euxinum</i> R. | 27 m ² |
| <i>Cirsium pseudopersonata</i> Boiss. & Bal. subsp. <i>pseudopersonata</i> | 110 m ² |
| <i>Cirsium poluninii</i> Davis & Parris | 9 m ² |
| <i>Trifolium pannonicum</i> Jacq. subsp. <i>elongatum</i> (Wild.) Zoh. | 36 m ² |

Table 4. General localite features of rare species.

| Species | Distribution areas | altitude | aspect |
|---|--|-----------|-------------|
| <i>C. pseudopersonata</i> ssp. <i>pseudopersonata</i> | Taflan, Kertme, Beylik and Çetirlişipinar villages | 100-150m | NW and E |
| | Kurugökçe, Ağcaalan villages | 450 m | NE |
| | Ağcaalan, Asmaçam villages | 750-850m | NE and E |
| | Kurugökçe and Elmaçukuru villages | 250-800 m | N and NE |
| <i>A. euxinum</i> | Kurugökçe and Elmaçukuru villages | 250-800 m | N, NE and E |
| <i>C. poluninii</i> | Kurugökçe and Elmaçukuru | 700 m | NE |
| <i>T. pannonicum</i> subsp. <i>elongatum</i> | İnözükkoşaca, KızılırmaK valley | 0-300 m | N |
| <i>A. apterocarpa</i> | Bafra, Köseli villages | 200 m | - |
| <i>L. flavum</i> subsp. <i>scabrinerve</i> | Bafra, Ağcaalan villages | 300 m | - |
| <i>G. asphodeloides</i> subsp. <i>sintensisii</i> | Bafra, Akteke villages | 30 m | - |
| <i>G. cinereum</i> subsp. <i>subcaulescens</i> var. <i>ponticum</i> | Bafra, Nebyan Mount | 1200 m | N |
| <i>G. aucheri</i> | Merkez, Akalan villages | 700 m | - |
| <i>L. czechottianus</i> | 19 Mayıs, Fındıcak River | 25 m | - |
| <i>C. consanguinea</i> | Merkez Güney villages | 650 m | - |
| <i>H. lasiochaetum</i> | 19 Mayıs, Ormancık villages | 200 m | - |
| <i>S. bornmuelleri</i> | Bafra, Nebyan Mount | 1200 m | N |
| <i>V. multifida</i> | Bafra, Ağcaalan villages | 350m | - |
| <i>L. gundelsheimeri</i> | Merkez Elmaçukuru villages | 750 m | - |
| <i>G. margaceum</i> | Bafra, Ağcaalan villages | 250 m | - |
| <i>F. cyllenica</i> subsp. <i>uluana</i> | Bafra, Ağcaalan villages | 300 m | - |
| <i>F. pontica</i> | Merkez Kurugökçe villages | 100 m | - |
| <i>F. paphlagonica</i> subsp. <i>paphlagonica</i> | Merkez Elmaçukuru villages | 800 m | - |

4. Discussion

Temperate deciduous and Mediterranean-type communities and stream vegetation types occurred in the study area. 17.2% European-Siberian elements, 9.65% Mediterranean elements, 7.52% Euxine elements, 2.29% Irano-

Turanian elements and 0.65% Hyrcano- Euxine are found in the study area. The percentages of cosmopolitan taxa are 0.81%. The percentage of rare and endemic plants is 3.025% and these plants included in IUCN. In general, most of the rare and endemic plants are Euro-Siberian origin, but some of them belong to Mediterranean phytogeographical region. Mediterranean taxa are found as enclaves in the study area and most characteristics taxa are *Phillyrea latifolia* L., *Arbutus andrachne* L., *Erica arborea* L., *Laurus nobilis* L., *Daphne sericea* Vahl., *Olea europaea* L. var. *sylvestris* L. and *Cistus creticus* L.

Centaurea consanguinea and *Genista aucheri* are endemic species and according to Atamov et al. (2014) the threat category of *Centaurea consanguinea* is EN, while *Genista aucheri* belonging to LR. It has been determined that the threat categories of *Linum flavum* L. subsp. *scabrinerve* (Davis) Davis and *Veronica multifida* L. are LC (Özen, et al., 2013; Hayta and Bağcı, 2013), while the threat categories of these species are determined as LR(ic) in the present study.

Festuca pontica and *Cirsium poluninii* are under threat. According to IUCN categories this species belonging to EN and VU categories, respectively. It has been found that *C. poluninii* population has a larger population than *F. pontica*. It has also been determined that both species are still under threat. *T. pannonicum* subsp. *elongatum*, *A. euxinum*, *C. pseudopersonata* subsp. *pseudopersonata* belonging to LR (lc) category and these species have comparatively large population, while the other 13 species in LR (lc) category have not a large population. *Festuca cyllenica* Boiss. Et Heldr. subsp. *uluana* Markgr.-Dannenb. Belonging to LR (nt) category, while *Festuca paphlagonica* (St.-Yves) Markgr.-Dannenb. subsp. *paphlagonica* (St.-Yves) Markgr.-Dannenb. Markgr.-Dannenb belonging to LR (cd) category. *Festuca pontica* (E. Alexeevex) Marlgr. Dannenb. and *Cirsium poluninii* Davis & Parris are belonging to EN and VU categories, respectively and they are prior species for protection in the study area.

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