

# Natural Forest Types and Their Differential Species on Genya Mountain-Artvin\*

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**Abstract:** To be successful in forestry practices, all factors affecting forests and the interactions among them should be determined. It is important to study and understand the structure and dynamics of forests and make an inventory of existing and non-degraded homogeneous areas of natural forest types in the country. This study was conducted to determine different forest types and their differential species on Genya Mountain in Artvin. Based on the results determined by the Braun-Blanquet method, a total of 8 forest types and 2 typical sub-forest types for type IV, and 3 typical sub-forest types for type VIII were determined. These were as follows: I. *Rhus coriaria-Carpinus orientalis* forest type, II. *Cistus creticus-Junipeurus foetidissima* forest type, III. *Ostrya carpinifolia-Carpinus orientalis* forest type, IV. *Lotus corniculatus-Quercus petraea* subsp. *iberica* forest type, IV-1. *Carpinus orientalis* sub-forest type, IV-2. *Pinus sylvestris* sub-forest type, V. *Quercus petraea* subsp. *iberica-Picea orientalis* forest type, VI. *Sedum stoloniferum-Picea orientalis* forest type, VII. *Carpinus betulus-Fagus orientalis-Picea orientalis* forest type, and VIII. *Rhododendron ponticum-Fagus orientalis* forest type, VIII-1. *Picea orientalis* sub-forest type, VIII-2. Typical sub-forest type, and VIII-3. *Abies nordmanniana* sub-forest type. Some suggestions regarding the present forest types are also given.

**Key Words:** Plant Sociology, Forest Type, Differential Species, Genya Mountain

## Artvin - Genya Dağının Doğal Orman Topluları ve Ayrırcı Türleri

**Özet:** Ormanlık uygulamalarında başarılı olabilmek için ormanı oluşturan bütün faktörlerin ve bu faktörler arasındaki etkileşimlerin bilinmesi gerekmektedir. Ülkemizde var olan ve henüz bozulmamış homojen doğal orman toplularının strüktürlerinin, dinamiklerinin tespiti ve anlaşılması, gerekli envanterlerin yapılması hayati bir önem taşımaktadır. Bu çalışma, Artvin-Genya dağındaki doğal orman toplularını belirlemek ve bu topluların ayrırcı türlerini tespit etmek amacıyla yapılmıştır. Braun-Blanquet yöntemi kullanılarak yapılan bu çalışma sonucunda, araştırma alanında, 8 orman toplumu tipi ve orman toplumu IV 'e ait 2, ve orman toplumu VIII 'e ait 3 tipik alt orman toplumu tipi belirlenmiştir. Belirlenen orman topluları ve alt birimleri şunlardır: I. *Rhus coriaria-Carpinus orientalis* orman toplumu, II. *Cistus creticus-Junipeurus foetidissima* orman toplumu, III. *Ostrya carpinifolia-Carpinus orientalis* orman toplumu, IV. *Lotus corniculatus-Quercus petraea* subsp. *iberica* orman toplumu, IV-1. *Carpinus orientalis* Alt Birimi, IV-2. *Pinus sylvestris* Alt Birimi, V. *Quercus petraea* subsp. *iberica-Picea orientalis* orman toplumu, VI. *Sedum stoloniferum-Picea orientalis* orman toplumu, VII. *Carpinus betulus-Fagus orientalis-Picea orientalis* orman toplumu, VIII. *Rhododendron ponticum-Fagus orientalis* orman toplumu, VIII-1. *Picea orientalis* Alt Birimi, VIII-2. Tipik Alt Birim, VIII-3. *Abies nordmanniana* Alt Birimidir. Makalede bu orman toplumlara ait bazı önerilere de yer verilmiştir.

**Anahtar Sözcükler:** Bitki sosyolojisi, Orman Toplumu, Ayrırcı Türler, Genya Dağı

## Introduction

The characteristics of forests should be examined in terms of structure, composition and function (Crow, 1989), because nature-oriented forestry requires information about forest dynamics. For that reason,

research should be carried out to determine the forest types and their differential species (Aksoy, 1978).

Forest type (association) is described as a part of a forest that shares the same site with others, but is discerned from the site by its species composition. In a

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forest, there are always continual competition and interactions among trees, shrubs, herbs, animals, insects and other organisms.

Just as in Turkey, the large forest areas of the world have undergone continual change and/or degradation through the intervention of man and natural disturbances. These alterations in forest structure can affect the conditions needed for the survival of many plant species. Thus, in some regions of the country, the main forest associations and the characteristics and structures of natural forests have been negatively affected by various forestry activities. Therefore, the characteristics of forests should be determined in order to sustain and understand natural forests and their dynamics and create a base for different nature-oriented forestry applications and for natural forest types (Aksoy, 1978; Özalp, 1989; Akman, 1995).

The importance of the subject has drawn great attention and several studies have been conducted. Among these are, the studies of Aksoy (1978) in Büyükdüz-Karabük research forest, Yöneli (1986) in Belgrad forest, Akman (1995) in the Cide-Kastamonu region and in the forests of Giresun, Küçük (1992) in the Örümcek forests of Kürtün-Gümüşhane, Özalp (1989) in Çitdere-Yenice, Vural (1996) in the Firtana-Rize valley, Terzioğlu (1998) in Uzungöl-Trabzon, Anşin et al. (1998) in the Black Sea region, Zohary (1973), and Mayer and Aksoy (1998) in the Çoruh valley.

In this study, the forest types and their differential species for the north exposures of Genya Mountain in Artvin province are determined. Some suggestions to protect and sustain present natural forest types are also given.

### Materials and Methods

The study area is located in the province of Artvin in the Black Sea region, located at an average altitude of 925 m above sea level and inclined (32 °) to the north. Its borders start from the junction of Fabrika creek and the Çoruh River (175 m) and it reaches the highest point at Keçi hill (2047 m) on Genya Mountain. The study area is shown in Figure 1.

According to the Erinç's (1984) precipitation efficiency formula, very humid climate conditions prevail in the area indicating humid area forest type. The climate of the study area is warm in winter and hot in summer. According to the Artvin meteorological station (597 m), annual mean precipitation was 689.4 mm, 243.7 mm of which fell in the vegetation period (Anonim, 1997). The annual mean temperature was 12.3 °C. The soil type is sandy-loam and soils were of various bedrocks such as granite, andesite, basalt and conglomerate. Soils derived from these bedrocks except conglomerate have good weathering capability and permeability.

A total of 160 sample plots each of which covers 400 m<sup>2</sup> were taken within the study area. In determining the

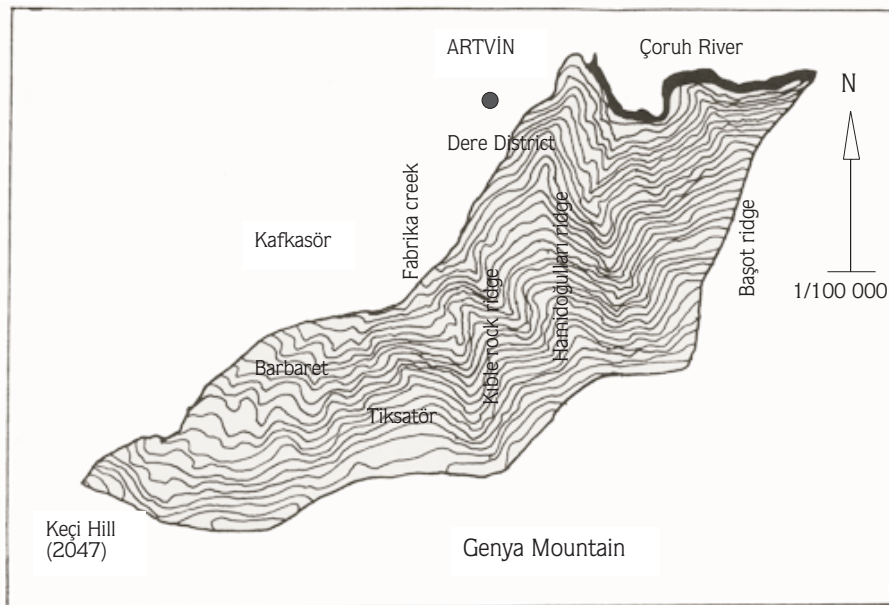


Figure 1. Location map of the study area

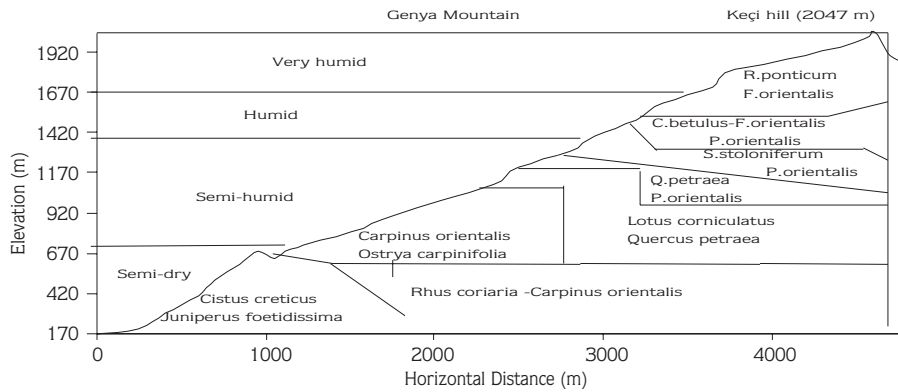


Figure 2. Crosssection of the study area with distribution of forest types, horizontal distance and elevation

location of the sample plots, well structured, minimally degraded and homogeneous areas in terms of species composition were selected. Using the Braun-Blanquet method, all the herbaceous and woody plant species in each sample plot were evaluated. Then, abundance and vegetation tables were prepared (Aksoy, 1978; Özalp, 1989; Davis, 1985). Later, forest types were named according to their coverage area and present proportion. Namely, the species having the lowest coverage areas and proportions were presented at the end of the abundance table, and those having the largest coverage areas and proportions are at the top. However, sometimes a third species with the same or higher coverage areas and proportions was also observed adjacent to the others. In this case, this typical sub-forest type was named by using the name of the third species.

## Results

The crosssection of the study area with relation to the distribution of forest types, horizontal distance and elevation are given in Figure 2.

According to the data, a total of 8 forest types and 2 typical sub-forest types belonging to the *Lotus corniculatus-Quercus petraea* subsp. *iberica* and 3 typical sub-forest type belonging to the *Rhododendron ponticum-Fagus orientalis* forest type were identified, and forest types and their differential species were as follows:

**I- *Rhus coriaria - Carpinus orientalis* Forest Type:** This association was distributed at Şehitlik village located between the Artvin-Erzurum road and the Çoruh River at an altitude of 175 m to 640 m. In this area, average inclination was 41 ° on north, northeast and northwest exposures. In general, this forest type was observed on

steep terrain, at the lower hillslopes and on ridges. Differential species of this forest type are shown in Table 1.

**II- *Cistus creticus - Juniperus foetidissima* Forest Type:** Like *Rhus coriaria-Carpinus orientalis* forest type, this type was also found between the Çoruh River and the Artvin-Erzurum road; however, it was mainly observed on the west sides of Van, on arable land in the area, at altitudes between 200 m and 650 m with average inclination of 46 °. It was generally seen on north and northeast exposures and exposed rocky places. Differential species of this forest type are presented in the Table.

**III- *Ostrya carpinifolia - Carpinus orientalis* Forest Type:** The distribution of this type was located from the Artvin-Erzurum road and Başot site in the area through the east sides of Nişgan creek and the Hanahuç area at altitudes between 200 m and 650 m on north, northeast and northwest exposures with an average inclination of 40 °. This type was generally observed on steep terrain, middle slopes and ridges. Differential species of this forest type are given in Table.

**IV- *Lotus corniculatus - Quercus petraea* subsp. *iberica* Forest Type:** This type was found in semi-dry and semi-humid regions at altitudes between 550 m and 1350 m, and had two sub-associations of *Carpinus orientalis* and *Pinus sylvestris*. The sub-forest types are as follows:

**IV-1. *Carpinus orientalis* sub-forest type:** This sub-forest type was distributed on the central part of the area and on the northern exposures, from Fabrika creek in the Çakmakçılar district in the east to Nişgan Creek. It was mainly found on lower hillslopes, middle hillslopes, ridges and between rivers at altitudes between 550 m and 1330

Table 1. Forest types and their differential species of Artvin-Genya Mountain

Rhus coriaria - Carpinus orientalis forest type	Cistus creticus - Juniperus foetidissima forest type	Carpinus orientalis-Ostrya carpinifolia forest type	Lotus corniculatus - Quercus petraea subsp. iberica forest type	
			Carpinus orientalis sub-forest type	Pinus sylvestris sub-forest type
<p>Acer divergens, Capparis ovata, Punica granatum, Euphorbia virgata, Ruscus acuelatus, Festuca drymeja, Asplenium adianthum-nigrum, Sedum album, Vicia cracca</p>	<p>Juniperus foetidissima, Acer hyrcanum subsp. hyrcanum, Cruciatia taurica Euphorbia amygdaloides, Sempervivum glabrifolium, Trifolium rhytidosemimum</p>	<p><b>Carpinus orientalis</b> Ostrya carpinifolia Pistacia terebinthus var. palaestina, Scutellaria albida subsp. colchica, Asplenium trichomanes, Lathyrus roseus, Fibigia eriocarpa, Dactylis glomerata</p>	<p><b>Quercus petraea subsp. iberica</b> Pinus sylvestris, Lotus corniculatus Dorycnium graecum, Lathyrus laxiflorus, Lysimachia verticillaris Chamaecytisus hirsutus, Acer campestre, Crataegus monogyna Cornus mas, Erysimum cuspidatum</p>	<p>Dactylis glomerata, Trifolium aureum, Argyrolobium biebersteinii, Brachypodium sylvaticum, Bromus squarrosus, Phleum paniculatum, Festuca heterophylla, Senecio vernalis, Centaurea simplicicaulis</p>

Table 1. Forest types and their differential species of Artvin-Genya Mountain (*continued*)

Quercus petraea subsp. iberica - Picea orientalis forest type	Sedum stoloniferum- Picea orientalis forest type	Carpinus betulus-Picea orientalis - Fagus orientalis forest type	Rhododendron ponticum - Fagus orientalis forest type		
			Picea orientalis sub-forest type	Typical sub-forest type	Abies nordmanniana sub-forest type
Sorbus torminalis, Ostrya carpinifolia, Quercus petraea subsp. iberica, Carpinus betulus, Coronilla varia, Digitalis ferruginea, Bromus lanceolatus, Meillotus officinalis	Castanea sativa	Picea orientalis			
	Tilia rubra, Taxus baccata, Ilex colchica				
		Rhododendron ponticum			
	Sedum stoloniferum, Sanicula europea, Oxalis acetosella, Arabis brachycarpa		Fagus orientalis		
		Carpinus betulus, Sorbus aucuparia, Lonicera caucasica, Frangula alnus, Aruncus vulgaris, Campanula rapunculoides, Achillea bisserrata, Ranunculus caucasicus, Hesperis matronalis, Hypericum androsaemum, Geranium robertianum	Ribes biebersteinii, Hedera colchica, Festuca amethystina, Euphrasia rostkaviana, Sanicula europea, Symphytum asperum		
				Vaccinium artostaphylos	
				Rhododendron luteum, Daphne glomerata, Galium odoratum, Trifolium medium, Gentiana septemfida, Hypericum orientale, Trachystemon orientalis, Rubus idaeus	
					Abies nordmanniana, Thymus praeox, Vaccinium myrtillus, Colchicum speciosum, Daphne pontica, Dactylorhiza euxina

m with an average inclination of 34 °. Dominant exposures were east, northeast, northwest and west. Differential species of this type are given in Table 1.

**IV-2. *Pinus sylvestris*** sub-forest type: This type was found as *Lotus corniculatus-Quercus petraea* subsp. *iberica* forest type, distributed on north, northwest and west exposures with average inclination of 39 ° at altitudes between 700 m and 1350 m and found on middle hillslopes and ridges from Başot area in the southwest to the Hadimoğulları district in the north (Table 1).

**V. *Quercus petraea* subsp. *iberica* - *Picea orientalis*** Forest Type: This association was found in two different areas between the north exposure towards the east belonging to Şikinegav creek and Kible rock ridge at the south, between altitudes 700 m and 1300 m. Average inclination was 38 ° on the north, northeast and northwest facing exposures. In general, this type was found on the lower hillslopes, middle hillslopes and on ridges (Table 1).

**VI. *Sedum stoloniferum* - *Picea orientalis*** Forest Type: This type was found similar to Forest Type V in two different areas between the north exposure towards the east belonging to Şikinegav creek and Sokran district through the Barbaret site at the south at altitudes of 750 m to 1350 m. In these areas, average inclination was 32 ° on the north, northeast and northwest exposures. In general, this type was observed on steep lands and on middle and lower hillslopes (Table 1).

**VII. *Carpinus betulus* - *Fagus orientalis* - *Picea orientalis*** Forest Type: This type was found along the Şikinegav Creek in the Barbaret site and towards Tiksator hill (1442 m) in the east. It was also found on east sites of Kible rock ridge at altitudes between 1150 m and 1670 m. Dominant exposures were north, northeast and northwest with an average inclination of 42 °. This type was mainly observed on middle and lower hillslopes.

**VIII- *Rhododendron ponticum* - *Fagus orientalis*** Forest Type: This type was found in the southern parts and sub-montane zones of the area, and classified in 3 different sub-forest types such as *Picea orientalis* sub-forest type, *Typical* sub-forest type and *Abies nordmanniana* sub-forest type.

**VIII- 1. *Picea orientalis*** sub-forest type: This sub-forest type was found on middle hillslope in the area around the Tiksator site at altitudes between 1380 m and

1820 m on north, northeast and northwest exposures. Average inclination was 42 °. Differential species of this type are shown in Table 1.

**VIII- 2. *Typical*** sub-forest type: This type was found at altitudes between 1360 m and 1979 m from Yanakale hill near the southern border of the research area to the east in which dominant exposures were north, northeast and northwest. Usually, it was found on sub-montane areas with an average inclination of 33 ° (Table 1).

**VIII-3. *Abies nordmanniana*** sub-forest type: This type was found on the southeast and southwest (Keçi hill) borders of the study area at altitudes between 1450 m and 2047 m at an average inclination of 29 °. Dominant exposures were north, northwest, east and northeast.

## Discussion

According to the results of the phyto-sociological studies conducted between 1997 and 1999, the following forest types and sub-forest types were determined:

- I- *Rhus coriaria* - *Carpinus orientalis* forest type
- II- *Cistus creticus* - *Junipeurus foetidissima* forest type
- III- *Ostrya carpinifolia* - *Carpinus orientalis* forest type
- IV- *Lotus corniculatus* - *Quercus petraea* subsp. *iberica* forest type
  - IV-1. *Carpinus orientalis* sub-forest type
  - IV-2. *Pinus sylvestris* sub-forest type
- V. *Quercus petraea* subsp. *iberica* - *Picea orientalis* forest type
- VI. *Sedum stoloniferum* - *Picea orientalis* forest type
- VII . *Carpinus betulus* - *Fagus orientalis* - *Picea orientalis* forest type
- VIII- *Rhododendron ponticum* - *Fagus orientalis* forest type
  - VIII- 1. *Picea orientalis* sub-forest type
  - VIII- 2. *Typical* sub-forest type
  - VIII-3. *Abies nordmanniana* sub-forest type

The results of the present study agree well with similar studies reported in the literature. Aksoy (1978) stated that beech and fir species create the *Fagus orientalis* - *Abies bornmülleriana* forest type. Similarly, in

this study, these species also created this kind of forest-type unity. However, in the eastern Black Sea region *Abies nordmannia* is naturally distributed and replaces *Abies bornmülleriana*. Yöneli (1986) identified one *Quercus petraea* subsp. *iberica* - *Picea orientalis* main forest type and sub-forest types of *Typical*, *Quercus frainetto* and *Fagus orientalis* in the Belgrad forest. In addition, Akman (1995) identified *Rhododendron ponticum* - *Ilex colchica* - *Abies bornmülleriana* and *Fagus orientalis* forest types in the Cide-Kastamonu region. The findings of these authors also support this study, because similar forest types were also observed in the research area. Furthermore, the forest type of *Picea orientalis* - *Fagus orientalis* was also reported by Akman (1995) in the forests of Giresun province. However, in the present study *Carpinus betulus* joins the forest type unity. The findings of Küçük (1992) for the Örumcek forests of Kürtün-Gümüşhane province show results similar to this study. In contrast to this study, the study of Özalp (1999) did not identify *Typical* sub-forest type for *Fagus orientalis*. In particular, on the sub-montane areas of the research area beech and rhododendron species were observed, and these species formed the *Rhododendron ponticum* - *Fagus orientalis* forest type and *Typical* sub-forest type.

The *Picea orientalis* species is distributed only in the eastern Black Sea region of Turkey. This species in the study area also formed the forest type with a *Sedum* species called *Sedum stoloniferum* - *Picea orientalis* forest type. This forest type was also reported by Vural (1996) for the Rize-Firtana valley and Terzioğlu (1998) for the Trabzon-Uzungöl area.

The findings of Anşin et al. (1998) on *Ostrya carpinifolia* show similar results in which they determined the *Scutellaria albida* subsp. *colchica* - *Ostrya carpinifolia* forest type. Although the forest type in this study was *Ostrya carpinifolia* - *Carpinus orientalis*, unlike the findings of Anşin et al. (1998), species composition showed a large proportion of similarity.

In the Çoruh valley, both Zohary (1973) and Mayer and Aksoy (1998) reported the existence of Mediterranean plant species. Zohary identified *Olea europea* - *Punica granatum* and *Juniperus oxycedrus* - *Pistacia terebinthus* forest types. Mayer and Aksoy reported the existence of the *Juniperus foetidissima* - *Juniperus excelsa* forest type. In the present study, on the lower part of the research area the *Cistus creticus* - *Juniperus foetidissima* forest type was determined, which agreed well with the findings of previous studies.

## References

- Akman, Y. 1995. Türkiye Orman Vegetasyonu. Ankara Üniversitesi, Fen Fakültesi Botanik Anabilim Dalı. Ankara.
- Aksoy, H. 1978. Karabük - Büyükdüz Araştırma Ormanındaki Orman Toplulukları ve Bunların Silvikültürel Özellikleri Üzerine Araştırmalar. Doçentlik Tezi. İ.Ü. Yayın No: 2332. Orman Fakültesi Yayın No: 237. İstanbul.
- Anonim, 1997. Artvin Meteoroloji İstasyonu İklim Değerleri (1948-1997).
- Anşin, R. 1976. Trabzon-Meryemana Araştırma Ormanı Florası ve Saf Ladin Meşcerelerinde Floristik Analizler. Doktora Tezi. İ.Ü. Fen Bilimleri Enstitüsü, İstanbul.
- Anşin, R. 1979. Doğu Karadeniz Bölgesi Florası ve Asal Vegetasyon Tiplerinin Floristik İçerikleri. Doçentlik Tezi. KTÜ Orman Fakültesi, Trabzon.
- Anşin, R., Z. Gerçek, N. Meriv, Z.C. Özkan, S. Terzioğlu, B. Serdar, ve T. Birtürk. 1998. Türkiye'deki Gürgen Yapraklı Kayacık (*Ostrya carpinifolia* Scop.)'un Yayılışı, Floristik ve Fitososyolojik Özellikleri. Kasnak Meşesi ve Türkiye Florası Sempozyumu. İ.Ü. Orman Fak., Orman Botaniği Anabilim Dalı, İstanbul.
- Braun-Blanquet, J. 1932. Plant Sociology (Translated by Fuller and Conrad). New York.
- Crow, T.R. 1989. Biological Diversity and Silvicultural Systems. In: Proceedings of The National Silvicultural Workshop: Silvicultural Challenges and Opportunities in the 1990 s, USDA Forest Service, Timber Management, Alaska pp.180-185.
- Çepel, N. 1988. Orman Ekolojisi. İ.Ü. Yayın No: 3118, Orman Fakültesi Yayın No: 399. İstanbul.
- Davis, P.H. 1965-1985. Flora of Turkey and the East Aegean Islands. Vol. I-X, University Press, Edinburgh.
- Eriç, S. 1984. Klimatoloji ve Metotları. İ.Ü. Yayınları, Yayın No: 3278, İstanbul.
- Küçük, M. 1992. Kürtün (Gümüşhane) - Örumcek Ormanlarının Florası ve Saf Meşcere Tiplerinin Floristik Kompozisyonu. Doktora Tezi. KTÜ Fen Bilimleri Enstitüsü, Trabzon.
- Mayer, H., ve H. Aksoy: 1998. Türkiye Ormanları (Walder der Türkei), Batı Karadeniz OAE. Muhtelif Yayın No:1, Bolu.
- Özalp, G. 1989. Çitdere (Yenice-Zonguldak) Bölgesindeki Orman Toplulukları ve Silvikültürel Değerlendirilmesi. Doktora Tezi. İ.Ü. Fen Bilimleri Enstitüsü, İstanbul.
- Terzioğlu, S. 1998. Uzungöl (Trabzon-Çaykara) ve Çevresinin Flora ve Vegetasyonu. Doktora Tezi. K.T.Ü. Fen Bilimleri Enstitüsü, İstanbul.

Vural, M. 1996. Rize' nin Yüksek Dağ Vegetasyonu. Tr. J. of Botany, 20 (1996) 83-102.

Yaltınk, F. 1966. Belgrad Orman Vegetasyonunun Floristik Analizi ve Ana Meşcere Tiplerinin Kompozisyonu Üzerine Araştırmalar. OGM Yayın No: 436/6, İstanbul.

Yönelli, V. 1986. Belgrad Ormanındaki Orman Toplularının Yapısı ve Silvikültürel Değerlendirilmesi. Doktora Tezi. İ.Ü. Fen Bilimleri Enstitüsü, İstanbul.

Zohary, M. 1973. Geobotanical Foundations of the Middle East. Vol. I. Gustav Fischer Verlag, Stuttgart.