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Orchid Species and Their Habitats Located in Ağdacı Campus of Bartın University, Turkey[1]

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Abstract

This research was based on the results of habitat survey of orchids and identification of orchid species which were present in the Ağdacı Campus Landscape, University of Bartın, Turkey. Orchid habitat survey was carried out by the field studies. Orchid species was identified through the literature sources, herbarium specimens and photos. According to the results, *Serapias vomeraceae* (Burm. fil.) Briq. ssp. *orientalis* Greuter (Long-lipped tangue orchid), *Anacamptis pyramidalis* (L.) L.C.M. Richard (Pyramidal orchid), *Orchis laxiflora* Lam. ssp. *laxiflora* (Loose-flowered orchid), *Orchis coriophora* L. (Bug orchid), *Ophrys apifera* var. *apifera* Huds. (Bee orchid) and *Ophrys oestrifera* M. Bieb. ssp. *oestrifera* (Horsefly orchid) orchids were found in the Ağdacı Campus Landscape. According to the habitat survey, orchid species were often found on sloping grassland slopes, road edges, borders, campus wall borders, under the trees and bushes. It was determined by the field observations that the campus orchids and habitats had decreased due to the grass mowing and human activities. There is a need for a campus landscape planning and design guide based on the natural species and habitat conservation in Ağdacı Campus. Therefore, the natural species and habitats of the campus should be identified. This information should be integrated with the campus landscape planning and design guide. Human activities in the campus landscape should be allowed only according to this guide.

Keywords: Native orchids and habitats, Campus landscape survey, Habitat management, Bartın University.

Bartın Üniversitesi Ağdacı Yerleşkesi'ndeki Orkide Türleri ve Habitatları

Öz

Bu araştırma, Bartın Üniversitesi Ağdacı Yerleşkesi'ndeki mevcut olan orkide türlerinin tespitine ve bulundukları habitatlara ait sörvey araştırmalarının sonuçlarına dayanmaktadır. Orkide habitatlarına yönelik sörvey araştırmaları, alan çalışmaları ile gerçekleştirilmiştir. Orkide türleri, literatür kaynakları, herbaryum örnekleri ve fotoğraflar aracılığıyla tespit edilmiştir. Elde edilen sonuçlara göre, Ağdacı Yerleşke Peyzajı'nda *Serapias vomeraceae* (Burm. fil.) Briq. ssp. *orientalis* Greuter (Uzun dudaklı orkide), *Anacamptis pyramidalis* (L.) L.C.M. Richard (Piramidal orkide), *Orchis laxiflora* Lam. ssp. *laxiflora* (Gevşek çiçekli orkide, Salep sümbülü), *Orchis coriophora* L. (Çam salebi), *Ophrys apifera* var. *apifera* Huds. (Arı orkidesi) ve *Ophrys oestrifera* M. Bieb. ssp. *oestrifera* (Sinek salebi) orkideleri bulunmuştur. Habitat sörveyine göre orkide türleri eğimli çimenlik yamaçlarda, yol kenarlarında, sınırlarda, yerleşke duvar kenarlarında, ağaç ve çalıların altlarında bulunmuştur. Yerleşke orkide ve habitatlarının çim biçme ve insan faaliyetleri nedeniyle azaldığı alan gözlemleri ile belirlenmiştir. Yerleşke'de doğal türlere ve habitatların korunmasına dayanan bir yerleşke peyzaj planlama ve tasarım rehberine ihtiyaç vardır. Bu nedenle Yerleşke'nin doğal tür ve habitatları belirlenmelidir. Bu bilgi, yerleşke peyzaj planlama ve tasarım rehberi ile bütünleştirilmelidir. İnsan faaliyetlerine yalnızca bu rehbere göre izin verilmesi gerekmektedir.

Anahtar Kelimeler: Doğal orkide ve habitatları, Yerleşke peyzaj sörveyi, Habitat yönetimi, Bartın Üniversitesi.

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1. Introduction

Biodiversity generally refers to the natural species composition of plant and animal organisms in the ecosystems. If ecosystems covering all species still function well in spite of threats based on the human pressures, this indicates that the ecosystems are within its optimal conditions. The situation is more sensitive for the orchids. All the members of the Orchid family are the most developed of the flowering plant kingdom. For this reason, it is known that they need a very special habitat and optimum living conditions for their development within the ecosystem. If orchids are found healthy in any ecosystem, this is considered to be the evidence that the ecosystem continues functioning properly (Boesse, 2012).

The Orchidaceae family, which is recognized by the society as salep, stands out in the flowering plants with its diversity and striking morphological structure. Orchids can be found in all terrestrial ecosystems except polar and arid desert habitats. Species make the widest spread, especially in the tropical habitats (IUCN[2]/SSC[3] Orchid Specialist Group, 1996).

Dressler (1993) considers the existence of 19.501 species of 803 orchid genera in the Orchidaceae family all over the world. He indicates that they offer more diversity around the tropical regions than other ecosystems. Tropical habitats provide a livable environment for the 10.849 taxa belonging to 36 orchid genera, corresponding to 56% of the total species potential (IUCN/SSC Orchid Specialist Group, 1996). On the other hand, in Flora of Turkey, Davis (1965-1985), Davis et al. (1988), stated that the Orchidaceae family includes 187 orchid species belonging to 24 genera, and also according to Kreutz and Çolak (2009) there are 170 orchid species belonging to 23 genera. 30 taxa of which are endemic (Babaç, 2004; Bakış et al., 2011; General Directorate of Forestry, 2015).

Recent data provided by the Flora and Fauna Preservation Society (1994) show that in Turkey alone over 16 million orchid plants, involving at least 38 species, are collected each year for the production of salep. Many orchid species are now considered to be at the risk of extinction, directly or indirectly as a result of two types of human activities: Habitat alteration or destruction due to the land use changes, extraction of wild plants for trade. The sources of threats affecting orchids can be summarized in the following main and sub-headings (IUCN/SSC Orchid Specialist Group, 1996):

- Habitat destruction, modification, and fragmentation
    - logging,
    - agriculture and plantation activities,
    - fragmentated landscapes,
    - urban development and tourism,
    - mining
- Collecting
    - horticultural trade
    - amateur collection
    - consumable orchids.

University gardens are special habitats that offer life opportunities for many endemic or endangered plant species, especially orchids. They constitute important piece of the urban and rural landscape mosaic. At the same time, they form integrated system with the vulnerable species and habitats. In short, campus ecosystems play crucial role in the conservation of natural heritage. Explanation of Iain Patton, from Environmental Association for Universities and Colleges, about the Further and Higher Education Action for Biodiversity reads that (Hull Biodiversity Partnership, 2002):

"Today, more than ever, we are dependent for our sustainance, health, well-being and enjoyment of life on fundamental biological systems and processes. As seats of learning for life, our universities and colleges must pionerr a new appreciation of our co-dependence".

The campus biodiversity and habitat action plan guides, followed particularly in the developed countries, are intended to help the higher education institutions to take action on biodiversity and nature conservation. These guidelines play an important role for the biodiversity management and for the development of campus landscape. They also provide the necessary knowledge for all the staff ranging from the caregivers to the senior managers within the university. Furthermore, they provide a useful resource for university students or visitors

[2] IUCN: The International Union for Conservation of Nature
[3] SSC: The Species Survival Commission

who are interested with the biodiversity conservation. The United Nations Environment Program (UNEP) and the Global Universities Partnership on Environment and Sustainability (GUPES) aim to encourage higher education institutions to transform campuses into the effective spaces by supporting semi-natural campus landscape planning, design and management. The campus biodiversity and habitat action plan guidelines primarily intends to make universities take action on biodiversity. Guides also help to achieve some important benefits. So, they (EAUC[4], 2017):

- provide long-term benefits for the university, staff and students,
- create new habitats and provide life opportunities for the various flora and fauna species,
- create more awareness of biodiversity within the university,
- enable the creation of new partnerships between the university and local people,
- develop wildlife habitats within campus,
- support local biodiversity,
- improve the working environment of staff and students,
- keep the value of the campus in terms of biodiversity,
- enable people to live in increasingly healthy campus environments, and
- enable to keep people's interest active for the environmental concerns.

The research area of this study is Ağdacı Campus of Bartın University located in the Western Black Sea Region of Turkey. With its almost natural forests and pseudomaquis communities, cliffs, dune areas, riverbeds and riversides, rural and urban habitats Black Sea Region, where the research area is located, is an important area for EU[5] Natura 2000 habitats (European Commission, 2009). According to the report of European Commission (2009), it is observed that there have been many changes in area utilization that poses threat for the species and biotope diversity in the Black Sea Region particularly for the last 50 years and this is still ongoing today. According to these data, Black Sea coastal areas are intensively used for the agricultural and industrial activities, energy generation, mining works, shipping, cruises, urban development and tourism. Despite all these threats, Black Sea Region still offers an important shelter for the natural plant and wild life (European Commission, 2009).

Recently, orchids of Western Black Sea Region and their habitats have also been subjected to human pressure and threats. Despite all these negative effects, however, the region still continues to host natural orchids and highly private habitats. This study focuses on the native orchids and habitat conservation in the Ağdacı Campus, University of Bartın, Turkey.

2. Material ve Method

The research area of this study is Ağdacı Campus of Bartın University located within the Western Black Sea Region of Turkey and within boundary of the Bartın Province (Figure 1). Bartın province is in the scope of Euxine province of European Siberian phytogeographical region, A4 Bartın grid square (Davis, 1965-1985).

The Campus, formerly established as Faculty of Forestry, Zonguldak Karaelmas University, recently belongs to the Bartın University and is situated 5 km away from the southern part of the Bartın city center. The campus covers approximately 1,9 hectares of landscape (Topay et al., 2003).

In the review of the literature on flora and biotope mapping studies for Bartın region, the literature resources about the species of orchids, belonging to Yatgın (1996), Kaya et al. (1999), Yılmaz (2001), Başaran and Adıgüzel (2001), Kaya and Başaran (2006), Sarı Nayim (2010), Sarı Nayim and Ayaşlıgil (2015), Türkiş and Ertürk (2015), Tunçkol and Aksoy (2015), Tekebaş (2017), Ekici (2017), Kaya and Gümüş (2018) have been found out. In these, there is no research on the orchid species on the Ağdacı Campus, but in the field records of the study conducted by Ekici (2017) on geophytes in Bartın, it is only stated that *Orchis laxiflora* Lam. (Loose-flowered orchid) exists in the Ağdacı Campus.

Orchid habitat survey was carried out by the field studies. The orchid flora studies were implemented regularly in the campus areas during the vegetation periods between the years of 2014-2016.

The photos were taken for the identification of the species. Orchid species was identified through the literature review and herbarium plant samples. In this context, the studies of Davis (1965-1985), Sezik (1984) and Davis

[4] EAUC: The Environment Association for Universities and Colleges
[5] EU: The European Union

et al. (1988) was taken into consideration for the identification of the orchids located in Ağdacı Campus ecosystems.

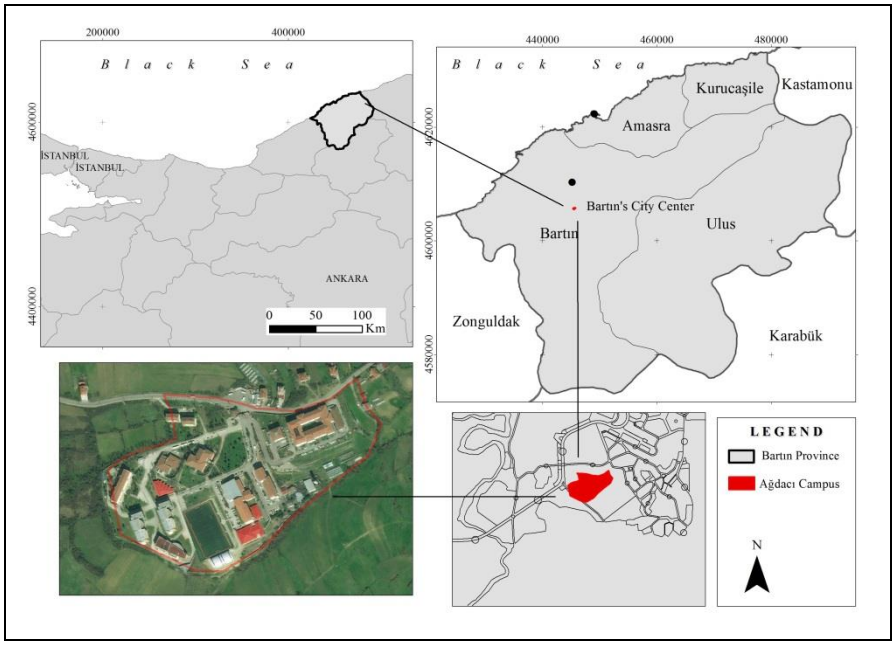


Figure 1. Geographical location of research area.

IUCN/SSC Orchid Specialist Group's (1996) "Orchid Action Plan", Hull Biodiversity Partnership's (2009) "Hull Campus Biodiversity Action Plan" and EAUC's (2017) "Biodiversity on Campus: An EAUC Practical Guide" phases were followed for performing the methodology of the study.

3. Results and Discussion

According to the findings of this study, it was found that existing traditional rural landscape surrounding the Ağdacı Campus consists of Ağdacı rural settlement, agricultural areas, deciduous forest communities, dry stream network systems, pedestrian and vehicle routes.

Agricultural landscapes are divided into 5 sub-ecosystems as follows:

- croplands,
- humid or semi-humid meadow areas,
- dry and semi-dry grasslands,
- hazelnut and poplar plantation areas,
- tree communities and hedgerows along the agricultural land borders.

According to the actual land cover data, Ağdacı Campus consists of, a dense core with green edges, dense natural and semi-natural vegetation, exotic plant materials and extensive sports fields. Five habitats have been identified within the Ağdacı Campus by evaluating the general habitat characterization of the area:

- the built environment,
- parks, sports and ceremony areas,
- pedestrian, vehicle road ecosystems and parking areas,
- trees, shrubs and hedgerows,
- grasslands and meadows.

According to the campus orchid flora results, *Serapias vomeraceae* (Burm. fil.) Briq. ssp. *orientalis* Greuter (Long-lipped tangue orchid), *Anacamptis pyramidalis* (L.) L.C.M. Richard (Pyramidal orchid), *Orchis laxiflora* Lam. ssp. *laxiflora* (Loose-flowered orchid), *Orchis coriophora* L. (Bug orchid), *Ophrys apifera* var. *apifera* Huds. (Bee orchid) and *Ophrys oestrifera* M. Bieb. ssp. *oestrifera* (Horsefly orchid) orchids were found in the Ağdacı Campus Landscape (Figure 2, Figure 3).

Figure 2. All orchid species were found in the Ağdacı Campus.

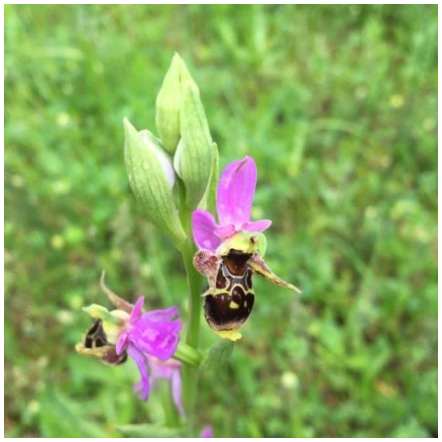
Serapias vomeraceae ssp. *orientalis*
(Long-lipped tangue orchid)

Anacamptis pyramidalis
(Pyramidal orchid)

Orchis laxiflora ssp. *laxiflora*
(Loose-flowered orchid)

Orchis coriophora
(Bug orchid)

Ophrys apifera var. apifera
(Bee orchid)



Ophrys oestrifera ssp. *oestrifera*
(Horsefly orchid)

Figure 3. All orchid species were found in the Ağdacı Campus.

According to the literature of "Flora of Turkey and East Aegean Islands", the general habitat characteristics of the orchids found in the area are as follows (Davis, 1965-1985; Babaç, 2004; Bakış et al., 2011):

- *Anacamptis pyramidalis* prefers habitats consisting of, phryganas, forest meadows and open grasslands, rocky slopes covered with maquis, and agricultural lands of hazelnuts and olive trees. This orchid is found at elevations between 0-1750 m.

- *Orchis laxiflora* ssp. *laxiflora* orchid, a Mediterranean element, lives in wet meadows and marshes habitats up to 1400 meter elevations.
- *Orchis coriophora*'s habitats are wet meadows between 20-1930 meters, forest openings, riparian zones of streams and dry sandy places.
- Habitats preferred by *Serapias vomeracea* ssp. *orientalis*, East Mediterranean element, are phryganas, maquis, meadows, wet areas, roadsides, ruins. This species spreads between 300-1000 m elevations.
- *Ophrys oestrifera* ssp. *oestrifera* prefers habitats between 150-1700 m. such as meadows, *Quercus* spp.(Oaks) scrubs, *Pinus* spp. (Pines) forests, roadsides and often wet places.
- *Ophrys apifera* var. *apifera*'s habitats range between 0-1750 m and include grassy limestone hillsides, maquis, phryganas, meadows, roadsides, coniferous and deciduous forests, cemeteries.

Orchids are rather sensitive to the disturbances. According to the habitat survey in the Ağdacı Campus, orchid species were frequently found on sheltered places such as follows (Figure 4):

- On sloping dry and semi-dry grasslands,
- road edges,
- green borders,
- grasslands or meadows close to campus wall borders,
- under trees, shrubs, climbers and hedgerows.

Anacamptis pyramidalis (Pyramidal orchid) were found in the grassland close to campus wall borders and under climbers in particular the dense *Hedera canariensis* (Canary Island ivy), road edges, green borders, areas where lawns can not be mowed due to trees, shrubs, climbers and hedgerows in campus (Figure 4).

Figure 4. These examples from habitats where orchids are found.

All orchids are included under Annex B of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). *Anacamptis pyramidalis*, protected by EU Habitats Directive, Bern Convention, CITES, EU regulation of trade of fauna and flora. *Orchis laxiflora* and *Orchis coriophora*, protected by CITES, EU regulation of trade of fauna and flora (EUNIS[6] , 2017a, 2017b, 2017c).

Only *Anacamptis pyramidalis* was evaluated according to the IUCN Red List categories. *Anacamptis pyramidalis, Orchis coriophora, Orchis laxiflora* s.str., *Serapias vomeracea* ssp. *orientalis, Ophrys apifera, Ophrys oestrifera* s.str. appear to take place in the EUNIS Species and Habitat Classification Database (EUNIS 2012a, 2012b, 2012c, 2012d, 2017a, 2017b, 2017c).

It's understood from the field observations that the Ağdacı Campus orchids and habitats have been decreasing especially due to the lawn mowing and intensive human activities.

4. Conclusions and Recommendations

In previous studies in Bartın region, 13 species at genus level and 38 species of orchids at subspecies and varieties level were determined Yatgın (1996), Kaya et al. (1999), Yılmaz (2001), Başaran and Adıgüzel (2001), Kaya and Başaran (2006), Sarı Nayim (2010), Sarı Nayim and Ayaşlıgil (2015), Türkiş and Ertürk (2015), Tunçkol and Aksoy (2015), Tekebaş (2017), Ekici (2017), Kaya and Gümüş (2018). In this study, 6 of these taxa were determined in Ağdacı Campus habitats. 5 of these taxa are common taxa when other studies are evaluated. It is observed that the *Ophrys apifera* var. *apifera*, which was determined during the Ağdacı Campus habitat survey, was previously identified only in the Bartın side of Küre Mountains National Park by Tunçkol and Aksoy (2015).

According to the campus orchid flora results, *Serapias vomeraceae* (Burm. fil.) Briq. ssp. *orientalis* Greuter (Long-lipped tangue orchid), *Anacamptis pyramidalis* (L.) L.C.M. Richard (Pyramidal orchid), *Orchis laxiflora* Lam. ssp. *laxiflora* (Loose-flowered orchid), *Orchis coriophora* L. (Bug orchid), *Ophrys apifera* var. *apifera* Huds. (Bee orchid) and *Ophrys oestrifera* M. Bieb. ssp. *oestrifera* (Horsefly orchid) orchids were found in the Ağdacı Campus Landscape (Figure 3).

Biotope or habitat loss is a major threat for the all natural species, including orchids. Bartın University necessitates for a Campus Biodiversity and Habitat Action Plan Guide based on the natural species and habitat conservation.

The following general conservation measures for the campus species and habitats are recommended:

- The natural species and habitats of the campus should be identified,
- this information should be integrated with the semi-natural campus planning, design and management plan,
- human activities in the campus landscape should be allowed according to these plans.

All orchids are included under Annex B of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Recommendations of this study for protection and management of existing and potential campus orchids are stated below:

Habitat management

Leave unmowed portion of lawns in front of Ağdacı Campus buildings to encourage potential orchids grow up. The actual orchid distribution areas in the following five different habitats of the campus identified in this study and listed below should be marked with wooden piles:

- The built environment,
- parks, sports and ceremony areas,
- pedestrian, vehicle road ecosystems and parking areas,
- trees, shrub and hedgerows,
- grasslands and meadows.

[6] EUNIS: The European Nature Information System

Habitat creation

Enhance orchid biodiversity on campus by developing new habitats.

- Creating a wildflower area in campus landscape

Wildflower meadows often one of the easiest habitats to create in the campus.

- Supporting semi-natural campus landscape planning and design

Designing safe habitats for orchid species on sloping dry and semi-dry grasslands, road edges, green borders, grasslands or meadows close to campus wall borders, under trees, shrubs, climbers and hedgerows.

Future developments in Ağdacı Campus

The University Facilities Directorate will work to integrate campus orchid biodiversity and habitat action plan considerations into future developments on Ağdacı Campus as part of the University of Bartın.

Finally, awareness of primarily the rector, the academic and administrative staff, students, visitors and local public, about the biodiversity of campus should be increased.

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I would like to thank all the orchid lovers who are the helping protection of species and their habitats.

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