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Geophytic Plants around the Akkaya Dam Lake (Niğde-Turkey)

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	Turkey	Turkey

Keywords: Akkaya Dam Lake, flora, Niğde, geophytes, wetland area

Abstract

This study was performed in a research area near Akkaya Dam Lake (Niğde-Turkey) which is considered as a “Wetlands of International Importance” and is geographically positioned in the middle of important wetlands such as Salt Lake, Ereğli Reeds, Göksu Delta, Sultansazlığı Marshes, and Seyfe Lake. Consequently, geophytic taxa around Dam Lake were determined. This study shows the region has 15 geophytic taxa belonging to 6 families and 13 genera. In this paper, the phylogenetic order of the families, Latin names, IUCN danger categories of endemic geophytes and distribution of geophytic taxa in Turkey according to Grid System and phytogeographical areas that they belong to are given. Three species are Mediterranean elements, six species are East Mediterranean elements, one species is Irano-Turanien element, one species is an Euro-Siberian elements and four species are pluriregional or unknown. Two taxa are endemic.

INTRODUCTION

Several flowering plant families contain species that have underground storage organs such as bulbs, corms and tubers; these plants are known as geophytes. Most of the bulbous plants in Turkey are known for their ornamental properties, mainly because of their flowers, however, a number of them also have important biological properties (Şener et al., 1999; Mammadov and Sahranç, 2003).

Turkey is very rich in geophytes. Many of the geophytes which adorn European gardens today originated from the Anatolia (Alp et al., 2009). As a part of this floral richness, geophytes, with their charming flowers, comprise 15% of the Turkish flora. Most of the geophytes species growing in Anatolia, are represented by 600 species, belonging to the families *Liliaceae*, *Amaryllidaceae*, *Ranunculaceae*, *Iridaceae*, *Primulaceae*, *Araceae*, *Geraniaceae* and *Orchidaceae* (Davis, 1965-1985; Çelik et al., 2004).

While some geophytes are used as ornamental plants, others are used in medicine and as food. However, the main economic value of these species in Turkey comes from collecting and exporting their bulbs as ornamental plants. Some geophytes have been exported since the time of the Ottoman Empire. Since the species belonging to the genera *Galanthus* and *Sternbergia* are collected excessively, their populations and distributions have been damaged. In more recent times, natural bulbs have been collected from 1960 to the present (Ergun et al., 1997).

The aim of this study is to survey geophytic taxa in the area of survey geophytic taxa in the area of Akkaya Dam Lake (Niğde/Turkey) which is considered as a “Wetlands of International Importance”. Dam Lake is geographically in the middle of important wetlands such as Salt Lake, Ereğli Reeds, Göksu Delta, Sultansazlığı Marshes, and Seyfe Lake and is of great interest for this survey. Consequently, geophytic taxa around Dam lake were determined.

MATERIALS AND METHODS

The materials of this study are the samples of geophytic plants collected in the

field during the field survey. The study area is shown in Figure 1. Localities, ridges, dates of the collection, habitats of these samples were recorded, the samples pressed, dried and turned into appropriate herbarium samples. Species collected were examined in the laboratory and determined using the relevant literature (Davis, 1965-1985; Davis et al., 1988).

The photos of the geophytic plants taken during the field survey and these photos are shown in Figure 2. Information on the plants, Latin names, IUCN danger categories of endemic geophytes, the distribution of geophytic taxa in Turkey according to Grid System and phytogeographical areas that they belong to are given (Ekim et al., 2000; IUCN, 2001).

RESULTS

As a result of our studies, it was detected that there are 15 geophytic taxa in total belonging to 6 families and 13 genera in the Dam Lake study area. These geophytic taxa are *Geranium tuberosum* L. subsp. *tuberosum*, *Scorzonera mollis* Bieb. subsp. *szowitsii* (DC.) Chamb., *Butomus umbellatus* L., *Allium curtum* Boiss. & Gaill., *Ornithogalum montanum* Cry., *Muscari comosum* (L.) Miller, *Tulipa humilis* Herbert in Both., *Gagea granatelli* (Parl.) Parl., *Colchicum triphyllum* G. Kunze, *Iris orientallis* Miller, *Iris stenophylla* Hausskn. & Siehe ex Baker subsp. *stenophylla*, *Crocus chrysanthus* (Herbert) Herbert in Both., *Gladiolus anatolicus* (Boiss.) Staph., *Orchis mascula* (L.) L. subsp. *pinetorum* (Boiss. & Kotschy), *Orchis palustris* Jack. Localities, distribution, phytogeographic area and habitat of these taxa are as follows:

Geraniaceae

1. *Geranium tuberosum* L. subsp. *tuberosum*. Locality: Nigde University Campus area, near student dormitory, 1220 m, 15.04.2006, Başköse 248 ve Paksoy. Distribution: A1, A2, A5, A7, A8, B1, B4, B6, C2→6 squares in Turkey. Phytogeographic area: unknown. Habitats: Stony slopes and disturbed habitats, especially fallow fields.

Asteraceae

1. *Scorzonera mollis* Bieb. subsp. *szowitsii* (DC.) Chamberlian. Locality: Nigde University Campus area, near student dormitory, 1220 m, 26.04.2006, Başköse 281 ve Paksoy. Distribution: A4, A5, A7, A8, B4→6, B9, B10, C3→7 squares in Turkey. Phytogeographic area: Irano-Turanian element. Habitats: Macchie and stony slopes.

Butomaceae

1. *Butomus umbellatus* L. Locality: Akaya dam lake northern side, 1210 m., 17.06.2005, Başköse 22 ve Paksoy. Distribution: A1→5, A7→9, B2, B3, B5→10, C2→8 and C10 squares in Turkey. Phytogeographic area: Euro-Siberian element. Habitats: lakes, ponds, ditches and swamps.

Liliaceae

1. *Allium curtum* Boiss. & G. Locality: Nigde University Campus area, around the Engineering Faculty, 1220 m, 25.06.2005, Başköse 100 ve Paksoy. Distribution: C4, C5 and C6 squares in Turkey. Phytogeographic area: East Mediterranean elements. Habitats: scrub, dry stony slopes and fields.

2. *Ornithogalum montanum* Cry. Locality: Nigde University Campus area, eastern side, 1220 m, 26.04.2006, Başköse 284 ve Paksoy. Distribution: A1, A2, B1, B3, C1→3, C5, C6 squares in Turkey and East Aegean Islands. Phytogeographic area: East Mediterranean elements. Habitats: scrub, hillsides and meadows.

3. *Muscari comosum* (L.) Miller. Locality: Akaya dam lake northern side, moist meadows, 1220 m, 03.05.2006, Başköse 291 ve Paksoy. Distribution: A1→3, B1→9, C1→9 squares in Turkey and East Aegean Islands. Phytogeographic area: Mediterranean elements. Habitats: *Pinus brutia* forest, *Quercus* woodland, near river, rocky slopes, common in wheat and fallow fields.

4. *Tulipa humilis* Herbert in Both. Locality: Akaya dam lake southern side, 1220 m, 31.03.2006, Başköse 242 ve Paksoy. Distribution: B5, B9, B10, C4, C5, C9 and C10 squares in Turkey. Phytogeographic area: unknown. Habitats: rocky limestone, shaly and igneous slopes and scree, mountain steppe, open *Abies - Juniperus excelsa* forest and near melting snow-patches.

5. *Gagea granatelli* (Parl.) Parl. Locality: Nigde University campus area, 1220 m, 10.03.2006, Başköse 228 ve Paksoy. Distribution: A4→7, B2→7, C2→5 and C8 squares in Turkey. Phytogeographic area: East Mediterranean element. Habitats: steppe, limestone cliffs, rocky slopes, scrub and open woods.

6. *Colchicum triphyllum* G. Kunze. Locality: Akaya dam lake northern and southern side, 22.02.2006, Başköse 225 ve Paksoy. Distribution: A4→6, B1, B3, B4, B6, B7, C3→5 squares in Turkey. Phytogeographic area: Mediterranean element. Habitats: stony steppe, roadside banks and sandy open slopes near melting snow.

Iridaceae

1. *Iris orientalis* Miller. Locality: Akaya dam lake eastern side, 1210 m, 17.06.2005, Başköse 23 ve Paksoy. Distribution: A2, A4→6, B1, B3→6 and C3 squares in Turkey. Phytogeographic area: East Mediterranean element. Habitats: damp meadows, irrigation channels and marshes.

2. *Iris stenophylla* Hausskn. & Siehe ex Baker subsp. *stenophylla*. Locality: Nigde University campus area, near student pension, 1220 m, 17.03.2006, Başköse 233 ve Paksoy, Endemic. Distribution: B3, B6, C3→5 squares in Turkey. Phytogeographic area: Mediterranean element. Habitats: rocky slopes and Macchie. IUCN Category: VU (Vulnerable).

3. *Crocus chrysanthus* (Herbert). Locality: Nigde University campus area, around the Engineering faculty, 1220 m, 03.03.2006, Başköse 226. Distribution: A1, A2, B1→3, B5, C2→6 squares in Turkey. Phytogeographic area: unknown. Habitats: open hillsides in short turf, sparse coniferous woods and scrub.

4. *Gladiolus anatolicus* (Boiss.) Staph. Locality: Akaya dam lake arounds, 1210 m, 20.06.2005, Başköse 56 ve Paksoy, Endemic. Distribution: C1→4, C6 squares in Turkey and East Aegean Islands. Phytogeographic area: East Mediterranean element. Habitats: macchie, *Pinus brutia* forest, on limestone. IUCN Category: LC (Least Concern).

Orchidaceae

1. *Orchis mascula* (L.) L. subsp. *pinetorum* (Boiss. & Kotschy). Locality: Akaya dam lake arounds, Wetland areas, 1210 m, 25.06.2005, Başköse 101 ve Paksoy, East Mediterranean elements. Distribution: A1→9, B1→9, C2→6, C9 and C10 squares in Turkey. Phytogeographic area: East Mediterranean element. Habitats: glades and edges of coniferous forest, *Fagus* forest and *Quercus* scrub.

2. *Orchis palustris* Jack. Locality: Nigde University campus area eastern side, 1220 m, 17.06.2005, Başköse 24. Distribution: A2→9, B3→10, C1→10 squares in Turkey. Phytogeographic area: unknown. Habitats: wet meadows and swamps.

DISCUSSION

In this study, we have identified 15 geophytic taxa belonging to 6 families and 13 genera. Only two of these taxa are endemic. Of the endemic taxa, *Iris stenophylla* subsp. *stenophylla* VU (vulnerable) and *Gladiolus anatolicus* LC (Least Concern) are located within the IUCN threat category (Ekim et al., 2000; IUCN, 2001).

Identified families are *Geraniaceae*, *Asteraceae*, *Butomaceae*, *Liliaceae*, *Iridaceae* and *Orchidaceae*. The most taxa were found in the *Liliaceae*.

The distribution of phytogeographic elements is as follows: Mediterranean 3 (20%), East-Mediterranean 6 (40%), Irano-Turanian 1 (6.7%), Euro-Siberian 1 (6.7%). However, phytogeographic elements of 4 taxa are not known (26.6%).

Land in the southern part of Dam Lake is agricultural and grazing activity is allowed there. Furthermore, spills of domestic waste and sewage into Dam Lake do occur,

both of which negatively affect the study area. Prevention of these factors and site restoration would greatly enhance the biological diversity and ecology of the area.

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Figures

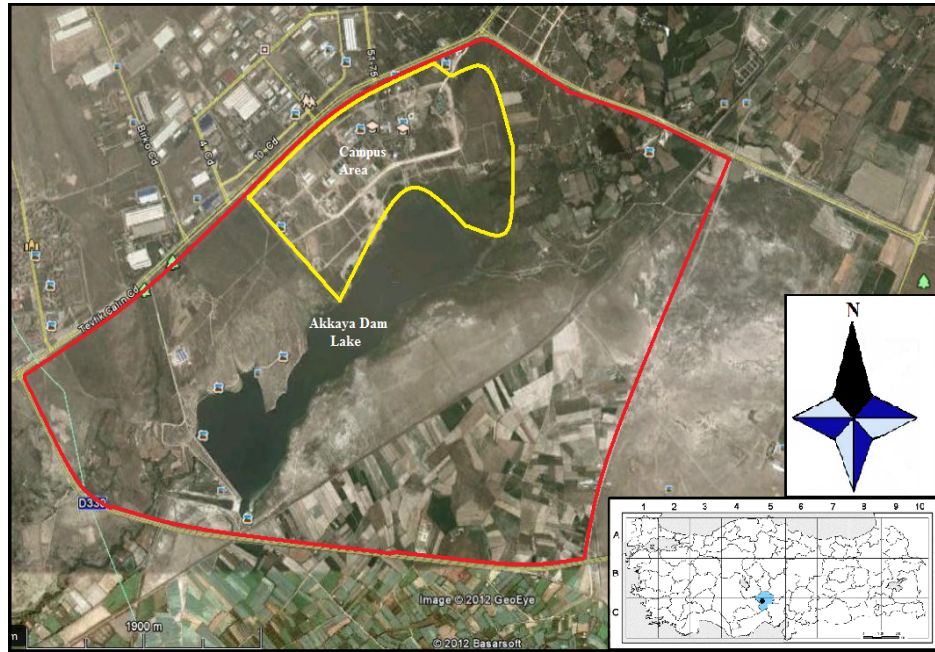


Fig. 1. The satellite photo of study area (Nigde/Turkey) (dark line: study area border, light line: Nigde University Campus area border).

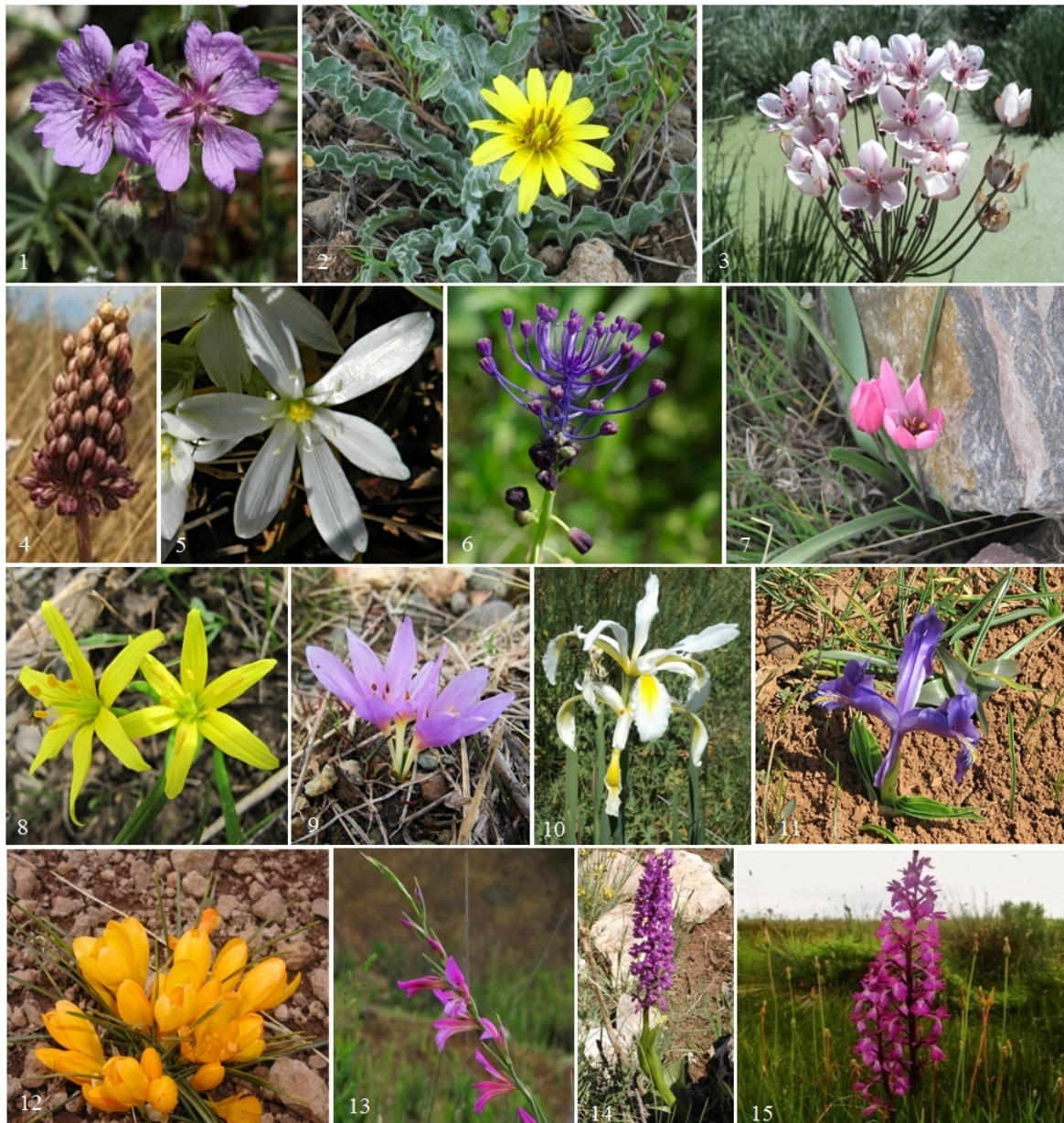


Fig. 2. Geophytes plants of Akkaya Dam Lake. 1. *Geranium tuberosum*, 2. *Scorzonera mollis* subsp. *szowitsii*, 3. *Butomus umbellatus*, 4. *Allium curtum*, 5. *Ornithogalum montanum*, 6. *Muscari comosum*, 7. *Tulipa humilis*, 8. *Gagea granatelli*, 9. *Colchicum triphyllum*, 10. *Iris orientallis*, 11. *Iris stenophylla* subsp. *stenophylla*, 12. *Crocus chrysanthus*, 13. *Gladiolus anatolicus*, 14. *Orchis mascula* subsp. *pinetorum*, 15. *Orchis palustris*.

