

İstanbul's flowering plant richness and two rare Apiaceae species*

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Abstract: The aim of this paper to summarize vascular plant diversity of the İstanbul province (Turkey). The province covers just 5110 km², yet support remarkably high diversity of plant richness with approximately 2500 flowering plant taxa more than total flora of the Netherlands or United Kingdom. The wide diversity of unusual habitats has allowed the development of an astonishingly rich flora. Grassland, forests, heathlands, sand dunes and other coastal habitats and wetlands within the province are high international importance to native conservation. Much of the province of İstanbul is of importance to nature conservation, but 7 areas stand out as being exceptional called Important Plant Areas: 1. Ağıldere & Ağaçalı dunes; 2. Terkos - Kasatura forests and coastline; 3. Gümüşdere-Kilyos dunes; 4. Hadımköy-Kemberburgaz Grassland and Heatlands; 5. Upper Bosphorus; 6. Sahilköy to Şile dunes & forests; 7. İstanbul's Asian Hills, Ömerli Basin. The most of herbarium specimens of the vascular flora of İstanbul have been deposited in ISTE Herbarium. Because of the this paper presented in the Apiales Meeting, the first Apiaceae specimens kept in ISTE, *Artedia squamata* L. and two rare Apiaceae species (*Peucedenum obtusifolium* and *Heptaptera triquetra*) have been discussed.

Key words: Apiaceae, Important Plant Area (IPA), *Peucedenum obtusifolium*, *Heptaptera triquetra*, vascular flora of İstanbul

Introduction

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*In this paper scientific part of the opening speech of the 8th International Symposium on Apiales held in İstanbul 1-4 August 2014 is reported. The symposium organized by İstanbul University Faculty of Pharmacy, Department of Pharmaceutical Botany, and ISTE Herbarium.

İstanbul University), organized the 8th International Symposium on Apiales in İstanbul 1-4 August 2014. Traditionally, the Apiales symposia are focused on systematics, phylogenetics, anatomy, morphology and ecology of the taxa belonging to this order; the topics related to pharmacognosy, cultivation, breeding etc. of these plants are beyond of its scope. This paper is extracted scientific part of the opening speech of the president in the Symposium. Mainly includes summary of İstanbul's plant richness, important plant areas of İstanbul, two rare Apiaceae species occur in İstanbul and Apiaceae specimens kept in ISTE Herbarium

İstanbul, one of the largest and most populated, Southern European cities. Each year its population swells by up half of a million individuals and today the city houses perhaps 15 million inhabitants. As such İstanbul is Europe's fastest growing contribution belonging of the world's mega cities. High population translate into huge demands for housing, industry, jobs, roads and other services. In satisfying this demand huge swathes of country site-verdant forest, internationally important heathlands and sand dunes are destroyed forever. The aims of this paper are present an overview of İstanbul vascular flora richness and the important plant areas of the city. Additionally to give information about ISTE (Herbarium of Faculty of Pharmacy of İstanbul University) which is very important center for İstanbul wild plants and two rare Apiaceae representative .

İstanbul Botanical Richness

The wide diversity of unusual habitats has allowed the development of an astonishingly rich flora. The province covers just 5110 km², yet support remarkably high diversity of plant richness with approximately 2500 flowering plant taxa more than total flora of the Netherlands or United Kingdom. Of particular importance to nature conservation are the province's rarer species. Over 270 species that are regarded as nationally rare and /or threated occur within the province. Of these some 40 species are more abundant here than anywhere else on earth. The richness of İstanbul is probably a result of the following unique set out conditions that prevail in İstanbul:

- Variety of soil,
- Varying climate due to its position between the two seas from

the damp cool climate of the Black Sea coast to the warmer Mediterranean climate of the Sea of Marmara,

- Position between the vastly different floras of two continents Europe and Asia,
- A long history of traditional land management, which has diversified and enhanced the province's habitats and flora.

İstanbul's Important Plant Areas

Important Plant Area (IPA) is a natural or seminatural site exhibiting exceptional botanical richness and/or supporting an outstanding assemblage of rare threatened and/or endemic species and/or vegetation of high botanical value. An identification of the threat status on in İstanbul: **Urgent:** The key botanical interests of the site are under considerable threat, leading to the significant degradation of the vegetation and/or flora. **Critical:** The key botanical interests of the site are under clear and immediate threat. These threats could lead to irreversible destruction (Figure1).

1. Ağildere and Ağaçlı dunes: 72 ha, Priority: URGENT

Despite the onslaught of open cast lignate mining tiny fragments of sand dune survive in three adjacent locations. They are still astonishingly rich in rare plants, a reminder of the former wealth of this part of the black sea coastline before its destruction. On the high golden sands, internationally important populations of *Aurinia uechtriziana*. *Isatis arenaria* and *Linum tauricum* subsp. *bosphori* thrive in abundance and for its rich flora with 14 local and nationally rare species, including large population of three Bern Convention Appendix I species (*Aurinia uechtriziana*, *Silene sangaria* and *Verbascum degenii*). Now during the Third Airport Works their population will be completely destroyed.

2. Terkos - Kasatura forests and coastline: 91.300 ha, Priority: URGENT

A vast mosaic of coppice forest, heathland and grassland stretch over

the northern hills of Thrace, and runs down to the sea. Terkos Lake and associated sand dunes form the biological centrepiece to the site, with waterlily filled waters covering 25 sq km, whilst the 51 km long wall of Anastasius and the well-presented aqueduct system of the Vize Roman Water Supply Line are exceptional historical features dating back 1500 years to Byzantine times. Dunes heath and forest provide a home to over 60 nationally rare plant species, and some of plant species are protected under the International Bern Convention. *Centaurea hermannii* and *Isatis arenaria* are more abundant here than anywhere else on earth. The site's flora is exceptionally rich: 575 vascular plant taxa have been recorded and the floras of the freshwater and sand dune ecosystems are amongst the richest in Turkey. Over 73 local and nationally rare plant species occur, including 10 species listed on Appendix I of the Bern Convention plus a further 8 Globally Threatened species.



Figure 1. Seven Important Plant Areas in İstanbul.

3. Gümüşdere-Kilyos Dunes: 200 ha, Priority: CRITICAL

Long known amongst hathers for its sandy beach, the sand dunes at Kilyos-Gümüşdere have been famed amongst botanists for over a

hundred years indeed the name Kilyos is commemorated in the names of several plants, for example *Centaurea kilaea* and *Jurinea kilaea*. The Kilyos sand dunes IPA lies on the Black Sea shore north of İstanbul. Its flora is considerable important, the occurrence of at least 15 nationally rare species. Include *Alyssum sribryni*, *Convolvulus persicus*, *Festuca beckeri*, *Isatis arenaria*, *Linaria odora* and *Matthiola fruticulosa*. Two species listed on Appendix I of the Bern Convention (*Silene sangaria* and *Verbascum degenii*). In addition the site is of some note on account of its relatively long history of botanical study dating back over 100 years (it is the type locality for at least four species). Despite being the second richest dunes along Turkey's Black Sea coast, the site remain unprotected and are threatened by a long list of destructive activities, including construction of secondary homes, extraction of lignite, conversion in cultivation and afforestation with alien trees.

4. Hadımköy-Kemberburgaz Grassland and Heatlands: 12.500 ha, Priority: CRITICAL

In the west of İstanbul, vast sweeps and heathland formerly stretched to the horizon, lightly grazed by domestic stock, and rich in orchids and butterflies. They are exceptionally importance: humid valleys; are rich in snowdrops and cyclamen, in early spring, whilst the drier grassland areas support the world's largest concentration. This site comprises the remaining fragments of limestone grassland, rock outcrops and dry acid heath grassland, situated on the low, undulating hills northwest of the İstanbul conurbation. Five species are listed App. I of Bern Convention, in addition either nationally rare species either or Globally Threatened Species including *Heptaptera triquetra* and very local İstanbul endemic species recently described *Cephalaria tuteliana* occur in the site. Today much has been destroyed by urban development and agricultural reclamation but a number of the large areas still survive.

5. Upper Bosphorus: 4.900 ha, Priority: CRITICAL

The Kuzey Boğaziçi (Upper Bosphorus) IPA comprises the remaining undeveloped shoreline of volcanic cliffs, sand dune and reed swamp that lie at the head of the Bosphorus, immediately north of İstanbul, together

with the woodlands of the nearby Belgrat Ormanı. The diverse mosaic of coastal vegetation types support a rich flora, including five species listed on Appendix I of the Bern Convention (*Aurinia uechtritzi*, *Centaurea hermannii*, *Cyclamen coum*, *Trifolium pachycalyx* and *Verbascum degenii*) plus a further six species that are either Globally Threatened and/or restricted to a handful of Turkish localities (namely *Asperula littoralis*, *Centaurea kilaea*, *Hepteptera triquetra*, *Isatis arenaria*, *Jasione montana* and *Linum tauricum* ssp. *bosphori*). Although severely damaged by afforestation, the cliff-top communities can be regarded as one of the best examples of highly exposed cliff top communities over igneous rocks in Turkey. The site largely falls within the Bosphorus Heritage Area (under the protection of the Bosphorus Law), but remains under continued threat from the demands of residential development and third bridge construction. In addition, the small, but rich, sand dunes at Riva have suffered considerably through sand extraction, construction of sporting facilities and other damaging activities.

6. Sahilköy to Şile dunes and forests: 1500 ha, Priority: CRITICAL

The Sahilköy-Şile Kıyıları (Sahilköy to Şile Coast) IPA comprises a mix of coastal scrub, heath and sand dune communities, backed by extensive of *Quercus*-dominated coppice forests, and lies on the Black Sea shores north-east of İstanbul. The sand dune vegetation and flora is of particular note, and whilst not quite as rich as the unique vegetation and flora of dunes to the west of the head of the Bosphorus, this IPA supports notably large populations of such Globally Threatened species as *Asperula littoralis*, *Centaurea kilaea*, *Silene sangaria* and *Verbascum degenii*. Two areas of the IPA receive some formal protection as Natural Heritage Areas, but nevertheless this whole stretch of coastline is under considerable pressure. The area is increasing in importance as recreational area for İstanbul's burgeoning population, with rapidly increasing usage of the beaches and dunes during summer, and the construction of secondary homes both on the dunes and in adjacent grassland/scrub habitats. Overgrazing by domestic stock also poses a problem locally within the sand dune elements of the site. Parts of the site are under considerable threat: the sand dunes at Şile have been partially allocated for housing, whilst those from Sofular to Sahilköy are threatened by nearby expansion of settlements and overgrazing.

7. İstanbul's Asian Hills , Ömerli Basin: 52.600 ha, Priority:

CRITICAL

The Ömerli Havzası (Basin) IPA comprises an extensive mosaic of heath, and acid coppice forest, with a wide range of associated habitats such as grassland, seepage mire on peat, and seasonally flooded trackways and pools. The flora is rich in rare species, with at least 37 nationally rare species occurring: for many here in their largest or only Turkish (or indeed world) populations (e.g. *Allium peroninianum*, *Centaurea amplifolia*, *Colchicum micranthum*, *Crocus olivieri* ssp. *istanbulensis*, *C. pestalozzae* ssp. *pestalozzae*, *Eleocharis carniolica*, *Rhynchospora brownii* ssp. *brownii*, *Trifolium pachycalyx*). A total of six species are listed on Appendix I of the Bern Convention. The heathlands are of exceptional importance as perhaps the only extant extensive heathland vegetation in the Eastern European and East Mediterranean regions, and are floristically important not only for a range of endemics, but also since number of species are present here in disjunct populations away from their center of distribution. The occurrence of low altitude stands of Black Pine (*Pinus nigra* ssp. *pallasiana*) adds considerably to the nature conservation value of these heathlands. The northern part of the site is largely clothed in coppice forests, which are particular importance for their immense scale, and due to the large-scale survival of active, sustainable traditional coppice production. The huge importance of the site is increased by the succession from phrygana, through heathland to forest over a relatively short distance, reflecting subtle changes in climate, topography and geographical. Parts of the site receive protection, either through designation of National Park (at Polonezköy) or by lying within the water catchment of Ömerli Reservoir. However, unfortunately the bulk of the site is under immense threat, particularly towards in southern edge where it abuts the conurbation of İstanbul. The heathland and grassland habitats, in particular, are under intense pressure from development and afforestation. Unless conservation action is undertaken now, it is unlikely that any substantial heathland areas will survive beyond the first decade of the twenty-first century.

Two Rare Apiaceae Species in İstanbul

Two rare Apiaceae representative have been reported with their photos.

Sand Milk Parsley (*Peucedanum obtusifolium*) A prostrate carrot relative confined to sand dunes species grow western shores of the Black Sea of Turkey (personal communication with Dr. S. Jury during the Apiales Meeting he noticed it growing Bulgarian sand dunes shore of Black Sea) Triangular-stemmed Carrot (*Heptaptera triquetra*) this species grows only European part of Turkey and very local in İstanbul, Bahçeşehir and around.

1. *Peucedanum obtusifolium* Sm.

P. obtusifolium is an attractive plant of maritime sands (Figure 2). It is a glabrous, prostrate perennial with a thick rootstock branched from near base. Basal leaves 2-pinnate. Umbels 5-6-rayed. Flowers sulphur yellow, 10-25 per umbellule. Winged fruits orbicular, 10-12 × 9-10 mm, wing c.1.5 mm wide. This species confined to sand dunes and apparently endemic to the South-western shores of the Black Sea coastline and listed as rare (VU) in the Turkish Red Data Book. A record from Greece appears to be erroneous. Approximately 15 populations are known, at risk from sand extraction, afforestation and construction of secondary houses .



Figure 2. *P.obtusifolium* in wild habitat, sand dunes of Terkos-Kasatura

2. *Heptaptera triquetra* (Vent.) Tutin

Heptaptera triquetra tall, glabrous perennial plant with distinctly triquetrous stem. It has atypical stem and leaf shape in the family Apiaceae. Basal leaves undivided to 1(-2)-pinnatifid. Rays 10, 8-12 cm long. Petals yellow. Mericarps broad-ellipsoid, $8-9 \times 5-7$ mm. It is a grassland and coppice forests plant currently known from just three localities in İstanbul province and a handful of additional colonies elsewhere. This endangered species is severely threatened by urban expansion and is currently one of the most endangered flowering plant species in the İstanbul province and Turkey. (Byfield & Özhatay, 1995). During latest project action plan of *Cephalaria tuteliana* (Dipsacaceae) which is local endemic to İstanbul observed that *H.triquetra* population seriously destroyed (Figure 3).



Figure 3. *H. triquetra* in wild habitat Bahçeşehir. General habitat and mature fruit.

The family Apiaceae in ISTE

The Herbarium of Faculty of Pharmacy of İstanbul University (ISTE)

The Herbarium of Faculty of Pharmacy of İstanbul University (ISTE) is founded in 1945. This herbarium has got an international acronym, as ISTE, in 1956. Since ISTE is located in the Faculty of Pharmacy, medicinal plants and medicinal families are well kept. And it is located in İstanbul, vascular plants of İstanbul well presented, it is most important Herbarium for this aspect. The herbarium contains research collection of about 130.000 dried plant specimens which are arranged in alphabetical order and stored in the metallic cabinet. In 2006 ISTE is celebrating its fiftieth anniversary to get the acronym, designing a logo and organizing "International Herbarium Techniques Course" with the Royal Botanic Gardens, Kew. ISTE is one the largest herbarium in the number of the specimens and the most organized herbarium in Turkey.

- About 80% of Turkey and 90% of İstanbul flowering plant species are housed in ISTE.
- About 3000 specimens of Apiaceae collected all around from Turkey are deposited in ISTE belonging to 100 genera of the family
- Rich collection: The following genera are represented by nearly all Turkish taxa: *Allium*, *Arum*, *Asphodeline*, *Bellevalia*, *Biarum*, *Centaurea*, *Colchicum*, *Crocus*, *Cyclamen*, *Eminium*, *Ferulago*, *Helichrysum*, *Hyacinthus*, *Hyacinthella*, *Iris*, *Muscari*, *Papaver*, *Rosa*, *Salvia*, *Sedum*, *Scilla* etc.

Apiaceae in ISTE

Apiaceae is represented by 104 genera including (4 Monotypic Endemik Genera: *Crenosciadium siifolium*, *Ekimia bornmuelleri*, *Microsciadium minutum*, *Olymposciadium caespitosum*) 477 species (510 taxa) in Turkey (Davis PH (ed.) (1965-1985); Davis PH, Tan K & Mill RR (1988). Güner A, Özhatay N, Ekim T & Başer KHC (2000). In ISTE, about 3000 specimens belonging to 100 Apiaceae genera are kept. The first Apiaceae specimen is belong to *Artemisia squamata* L. collected by Saint-Lager in 1905, and its ISTE number is 2342 (Figure 4). Saint-Lager (1825-1912) was a French

physician, botanist and botanical historian based in Lyon. 1862, he devoted himself to scientific study, travelling to make collections for his research on both botanical and medical. On the other hand the other first Apiaceae specimen collected in 1953 by ISTE staff (Prof. Dr. Asuman Baytop) is *Bupleurum falcatum* and its ISTE number is 2344.



Figure 4. The first specimen of Apiaceae collected by St-Lager in 1905 and sent to ISTE as gift G Herbarium.

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