

Plant biodiversity and unique yew stands of Istranca (Yıldız) mountains in

European Turkey

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Abstract

Population of *Taxus baccata* in the western point of Turkey has been identified in cooperation with Central Anatolia Forestry Research Institute and Bulgarian Academy of Science (BAS) during the project entitled “Conservation and Sustainable use of Biodiversity in Istranca (Yıldız) Mountain – Challenges and Opportunities for Promotion and Implementation of the Transboundary Biosphere Reserve Concept (37534303 TUR)”. *Taxus baccata* hot spot contains *Cylamen coum* var. *coum*; an endangered species according to the Bern Convention appendix I list, on European scale. The most important characteristics of this population is the height of the trees. They are also the secondary tree population in the rainforest, which are completely grown under shade conditions.

Keywords

Conservation, European Turkey, *Taxus*, *Taxus baccata*, yew

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INTRODUCTION

Taxus baccata L. (yew) is a small, evergreen, dioecious and coniferous tree which can grow up to 20 meters in height. The bark of the tree is reddish-brown. Leaves are alternate, needleless and narrow with flattened margins. The ripe fruit consists of a seed enclosed by a red fleshy

cup-shaped structure, named as aril (Figure 1). All parts of the plants, especially the seeds, except the red arils are extremely poisonous. The red arils contain taxol modified diterpenes which, interestingly, have a broad spectrum of activity (Trease and Evans 1983).



Figure 1: An illustration of *Taxus baccata* (Hand drawn by Gülten Yeğenağa).

Taxus baccata is distributed naturally to western, central and southern Europe, northwest Africa, northern Iran and southwest Asia (Tutin *et al.*, 1964-1980). In Turkey, it is mainly spread out along North Anatolia. It is often planted out as an ornament in parks and gardens with several different varieties.

***Taxus baccata* in European Turkey**
European Turkey (Thrace) occupies a small part of Turkey, and has a surface area of 23.500 km². It is situated in the north side of the Sea of Marmara, which connects the

Black Sea and Aegean Sea via the straits of Bosphorus and Dardanelles that separate Europe from Asia. In comparison with Turkey's general topography, Thrace generally has low elevations. Davis (1965-1985), Webb (1966), Tutin *et al.*, (1964-1980) and Turill (1924) published the principal references that dealt with the flora of European Turkey. Apart from these main references, several recent papers, published by Baytop & Byfield (1997), Özhatay (1975), Özhatay *et al.*, (2003), Seçmen and Leblebici (1991, 1997), Yarcı (1997, 1999),

Yıldız (2009) and several check-lists, such as "Flowering plant & Fern of European Turkey" and "Check-list of additional taxa to the supplement flora of Turkey: Checklist III, IV, V, VI, VII, VIII and IX (Özhatay and Kültür 2006; Özhatay *et al.*, 2009, 2011, 2013, 2015, 2017, 2019)" have been published.

The distribution of *Taxus baccata* forest in European Turkey has been determined during two different projects:

Project I: 'Conservation and Sustainable use of Biodiversity in Istranca (Yıldız) Mountain 2007'. *Taxus baccata* forest was declared as Gene Conservation Forest (Mehtap & Karadağ 2008).

Project II: The plant diversity survey for the 'Yıldız Mountains Biosphere Project' was conducted between May to October 2009. The project area was located in the North-western corner of European part of Turkey and covered about 1300 km². The overall purpose of the Yıldız Mountain Biosphere Project was to assist landscape scale

conservation of biodiversity of Yıldız Mountains in a long-term plan.

Floristically, flowering plants and ferns (vascular plants) were the focus of the field survey (Akalın *et al.*, 2013). A total of 1364 plant taxa (1273 species) have been recorded from the project area. Within the study area, 15 endemic taxa and 55 rare species have been recorded, including *Allium rumelicum* Koçyiğit & Ozhatay (Koçyiğit and Özhatay, 2010) and *Allium urusakiorum* Ozhatay & Seregin (Kocyiğit *et al.*, 2016) introduced as new species to science.

Eleven floristic hot spots were assessed, identifying the İğneada and Kasatura areas as high-importance centres of plant diversity. Their coastline and sand dune habitats support the highest diversity of rare and endemic species. Figure 2 shows the boundry of the project area in North-western corner of European Turkey with bold black lines.

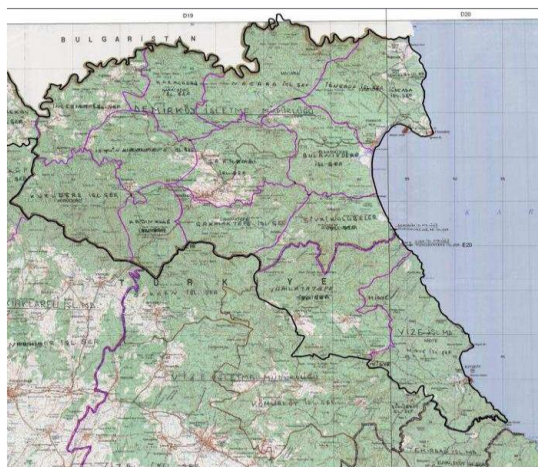


Figure 2: Boundry of the project area in North-western corner of European Turkey.

MATERIALS AND METHODS

The materials of *Taxus baccata* were collected and examined during the surveys of two different projects:

Project I: Conservation and Sustainable use of Biodiversity in Istranca (Yıldız) Mountain – Challenges and Opportunities for Promotion and Implementation of the Transboundary Biosphere Reserve Concept (37534303 TUR) (2008) project was carried out in cooperation with Central Anatolia Forestry Research Institute and Bulgarian Academy of Science (BAS). The field survey was performed using smallest area estimation method (Poore 1955), in a specific area of the forest which has a rich population of *Fagus orientalis*. During the field studies of the population of *Taxus*

baccata, approximately 50 individuals were counted. The area was determined as Gene Protection Forest.

Project II: Yıldız Mountains Biosphere Project supported by EuropeAid/125289/D/SER/TR. The plant diversity survey for the ‘Yıldız Mountains Biosphere Project’ was conducted during May-October 2009. Flowering plants and ferns (vascular plants) were the focus of the field survey. The specimens, that were collected and examined, were kept within the herbaria via ISTE (Herbarium of the University Istanbul, Faculty of Pharmacy) and ANKO (Herbarium of Ankara Forestry Research Institute).

RESULTS

Short description of *Taxus baccata* within the protected area of European Turkey is shown in Table 1.

Table 1: Short description of *Taxus baccata* within the protected area of European Turkey.

Protected area: A1 (E) Kırklareli/Demirköy - Mahya Mountain (Northwest)

Size: 121,5 ha

Characteristic vegetation and habitat: Beech forests and *Taxus baccata* (yew) forests

Number of plant species: 52 (taxa)

Number of endemic species: None

Conservation status: ÖBA NO 4 - Strandzha Mountains

Gene Conservation Forest: Yew (*Taxus baccata*)

Flora and vegetation of the area

The area, containing approximately 50 individuals of *Taxus baccata* trees, is under widespread *Fagus orientalis* (Oriental

beech) forests and in between dense *Rhododendron ponticum* ssp. *ponticum* (*Rhododendron* with pink flower) bushes.

This habitat is utterly dense and receives less sunlight. *Fagus orientalis* (oriental beech) trees cover this area with a dense forest vegetation. *Acer trautvetteri* (maple), *Sambucus nigra* (elderberry) and *Laurocerasus officinalis* (cherry laurel) are found in the spaces near forest roads. There are few individuals of *Ilex colchica* (restharrow) and *Daphne pontica* within a part of the forest under low sunlight.

Cyclamen coum var. *coum* and *Anemone nemorosa* are endangered species according to the national scale of Bern Convention Appendix I List.

Taxus baccata hot spot includes 2 endangered habitats as stated by Bern Convention Appendix IV List. These are 41.1E122 Strandzha Mountains (Istranca) *Rhododendron* – Oriental beech forests and 42.A7 Western palearctic yew forest communities. The list of the species which occur in the *Taxus baccata* hot spot:

Acer pseudoplatanus L.

Acer trautvetteri Medw.

Anemone nemorosa L.

Anthemis cretica L. subsp. *tenuiloba* (DC.) Grierson

Asplenium adianthum – *nigrum* L.

Aphodeline lutea (L.) Reichb.

Bellis perennis L.

Brassica nigra (L.) Koch

Calamintha grandiflora (L.) Moench

Campanula rapunculus L. var. *lambertiana* (A. DC.) Boiss.

Cardamine bulbifera (L.) Crantz. (Foto 1)

Ceterach officinarum DC.

Cornus mas L.

Cyclamen coum Miller var. *coum*

Daphne pontica L.

Digitalis viridiflora Lindley

Dorycnium graecum (L.) Ser.

Epilobium angustifolium L.

Fagus orientalis Lipsky

Fagus sylvatica L.

Fragaria vesca L.

Galium rotundifolium L.

Genista carinalis Gris.

Gentiana asclepiadea L.

Geranium robertianum L.

Hedera helix L.

Hypericum androsaemum L.

Hypericum bithynicum Boiss.

Ilex colchica Poj.

Laurocerasus officinalis Roemer

Ligustrum vulgare L.

Limodorum abortivum (L.) Swartz

Lysimachia punctata L.

Petasites hybridus (L.) Gaertner

Polygonatum hirtum (Bosc ex Poiret) Pursh

Polypodium vulgare L. subsp. *vulgare*

Primula vulgaris Huds subsp. *vulgaris*

Prunus spinosa L. subsp. *dasyphylla* (Schur) Domin

Pteridium aquilinum (L.) Kuhn.

Rhododendron ponticum L. subsp. *ponticum*

Ruscus hypoglossum L.

DISCUSSION

Taxus baccata (yew) communities in *Taxus baccata* hot spot are declared as Gene Conservation Forests in 2010 (OGM Or-Tohum, 2010). Since then, the area had gained conservation status. Since the area was located in Kurudere Forest Sub-District Directorate, forestry activities had continued until 2007. However, there was no logging during the breeding period on the authority of management policy for a decade before 2007. Furthermore, by the same management policy, road maintenance had not been done and the access into the hot spot area was very difficult. Hence, the area was kept free from human disturbance and pollution.

Taxus baccata hot spot contains *Cyclamen coum* var. *coum*; an endangered species according to Bern Convention appendix I list, on European scale. Additionally, on national scale, the endangered species *Acer pseudoplatanus*, *Anemone nemorosa*, and

Digitalis viridiflora are present in the area. Besides the two endangered habitats, Strandzha Mountains *Rhododendron*–Oriental beech forests and Western palearctic yew forest communities, the area is surrounded by *Rhododendron ponticum* ssp. *ponticum* community within dense oriental beech (*Fagus orientalis*) forest. This habitat is utterly dense and receives low sunlight. *Acer trautvetteri* (maple), *Sambucus nigra* (elderberry) and *Laurocerasus officinalis* (cherry laurel) are found in the spaces near forest roads. The area has only one gene conservation region. Silviculture activities continue in the area. There was no logging in the last decade. Silviculture activities should be planned and monitored in a sustainable manner and the changes, which might result from biotic and abiotic factors, should be observed and recorded.

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