

Determination of Potential Use in Urban Landscape Design of Natural *Abies* Taxa Grown at Different Altitudes in Turkey

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Abstract

Geography of Turkey with different altitudes up to 5,165 m asl has been effective for plant material selection in landscape design. Living quarters of many types, used in plant design vary depending on the different levels of altitude. Changing the ecological requirements such as soil and water of plant materials used in the design of urban green spaces partially or completely might be possible, but it is not possible to interfere with the distribution of plants depending on altitude. *Abies* taxa naturally grown in Turkey, which have an important potential in terms of landscape design, were taken as sample in this study. The geographic regions and altitude of potential lands for the fir taxa were determined by using Geographical Information Systems (GIS) in the present study. As a result, in most part of Turkey naturally grown *Abies* taxa can be used.

Keywords: *Abies*, Plant design, GIS

Botanical features of fir and its use in the landscape architecture

Fir, which is an evergreen conifer genus with almost 60 species, spreads naturally through the moderate and cool regions of the northern hemisphere such as Vietnam and Taiwan in the Southeastern Asia, tropical regions, Honduras and Guatemala in the South America. Furthermore, it is found in the North and Mid-America, Asia and North Africa. In this natural range, *Abies* taxa form pure and mixed forests on south latitude mountainous areas and on north latitude lower areas even along the sea coast. In other words, fir trees naturally grow in two wide spreading ecological zones. Most of the fir

species form pure forests in the alpine regions of northern hemisphere. Some of the species are typical mild climate trees and they mostly grow in mixture with oak and other species (Scots pine, torch pine). The fir trees, which are desired species for parks and gardens, relish marine and mountainous climates with high moisture; are shade tolerant and better develop in nutrition-rich, slightly sandy soils. If they are planted solitarily and in groups, fir trees represent the best sample of an emphasized plant. They are very suitable to be grown in rock gardens. At the same time, they can be planted with other species of trees and shrubs for creating noise, wind and visual shelterbelts.



Naturally Growing Fir Species in Turkey

Abies nordmanniana subsp. *nordmanniana*

The most distinctive features of this sub-species are their feathery sprays and resinous buds. Mostly, their sprays are narrower than in case of other sub-species. Male flowers are reddish pink. At present, they spread in the Caucasus region. They naturally grow in the lower regions of Bolu: Abant Lake, in Bursa: Uludağ, Bilecik: Gök Mountain and between Gerede and Kızılcahamam; along the northern slopes of Ilgaz Mountain, between

Zonguldak: Kozlu-Neyren and Keltepe; between Sinop: Boyabat and Sinop; in the regions of Samsun: Alaçam and Dütman Mountain. It is located at elevations between 800 and 1,700 m asl in the forest regions starting from Yeşilirmak through the Eastern Black Sea (Figure 1). Because of a distinct decorative feature, it can be used as an ornamental plant in parks and gardens. Its buds blow late and, as a result, it suffers less from early spring frost. It has an intermediate shade tolerance (Yaltrık and Akkemik 2011).

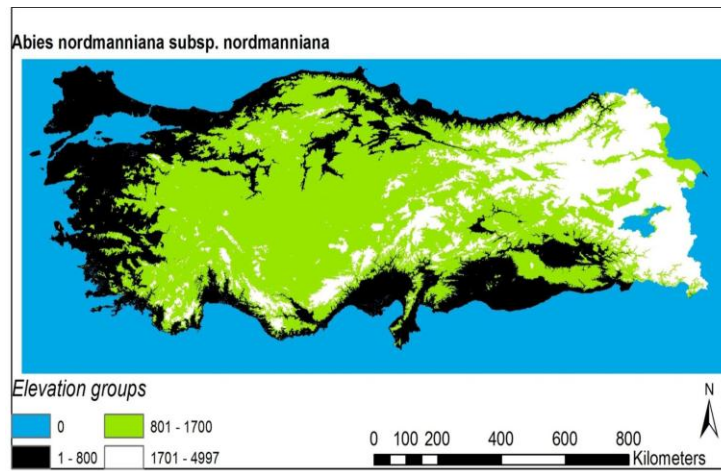


Figure 1. Green areas show the range of *Abies nordmanniana* subsp. *nordmanniana* in Turkey

Abies nordmanniana subsp. *bornmuelleriana*

The most distinctive features of this sub-species are shiny brown and bare sprays and, when dried, white resinous buds. The stomata strips lie on the upper surface of the leaves along the edge. Its sprays are thicker. The male flowers are colored in yellow-green. It is one of the endemic sub-species of Turkey. It has spread in the regions between Kızılirmak (Bafra) with Bursa–Uludağ, the West Black Sea and the Marmara. It is able to grow in the regions up to 2,000 m asl. It is a valuable tree owing to its potential for gardening. Predominantly it is located at altitudes between 1,100 and 1,800 m asl and

sometimes grows in the higher areas up to 2,000 m asl which is the upper limit of forest region (Figure 2) (Yaltrık and Akkemik, 2011).

Abies nordmanniana subsp. *equi-trojani*

This sub-species is located in the Kazdağı region. Because of its proximity to the Troy it is named after Trojan. The most distinctive feature of this sub-species is its sharp edge; while the regular Asian fir has 4 buds, this Kazdagi fir has 5, even 7 buds. This taxon, which has a pure spread over the heights of 800 m asl and mixed spread up to 1,700 m asl (Figure 3), grows faster than the other taxa (Yaltrık and Akkemik, 2011).

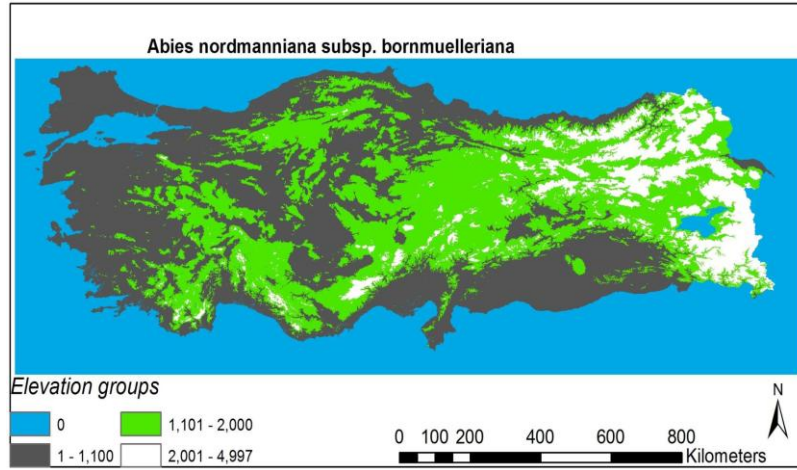


Figure 2. Green areas show the range of *Abies nordmanniana* subsp. *bornmuelleriana* in Turkey

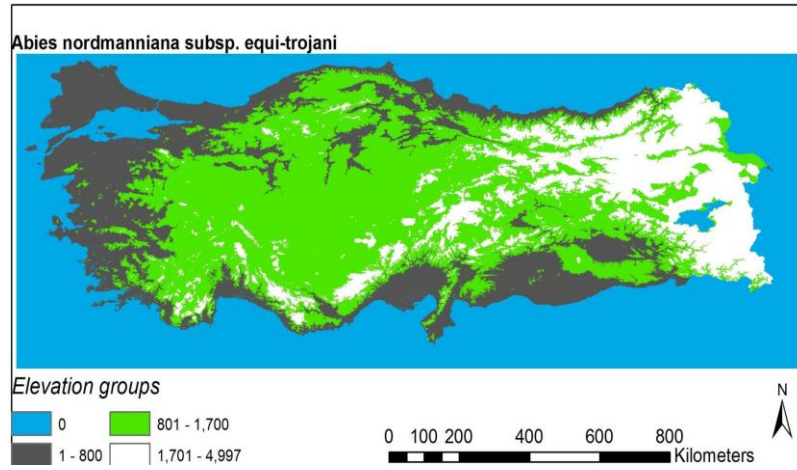


Figure 3. Green areas show the range of *Abies nordmanniana* subsp. *equi-trojani* in Turkey

Abies cilicica subsp. *cilicica*

The most distinctive feature of this subspecies is the fact that buds are non-resinous but shiny and young shoots are pubescent. Usually these are the dominant tree species at Taurus, Anti Taurus and Amanos Mountains in hillsides between 1,200-2,000 m asl. In Turkey it spreads to

Maras: Göksun, Binboğa Mountain; İçel: Gülnar, Taşoluk-Söğüt; Hatay: Belen, Karlıktepe; Maras: Ahır Mountain; Seyhan: Bahçe, Dilldil Mountain and Northern Lebanon (Figure 4) (Yalırık and Akkemik 2011).

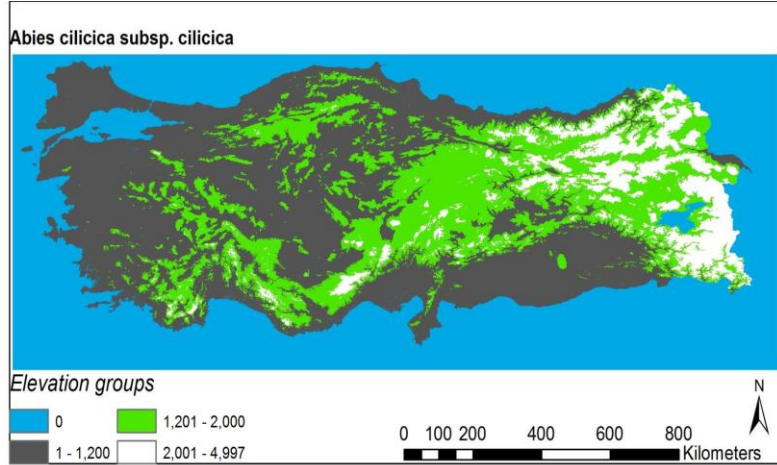


Figure 4. Green areas show the range of *Abies cilicica* subsp. *cilicica* in Turkey

Abies cilicica* subsp. *isaurica

Contrary to the other subspecies, the important distinctive features of this one are the resinous buds and bare young shoots. Mostly seen in West Taurus Mountains together with Taurus Cedar between 1,000-2,000 m altitude. It spreads in Mid- and West

Taurus Mountains, Antalya: between Durbanas-Derince River; Konya: between Geyik Mountain-Bozkır; Antalya: Bozburun Mountain (Figure 5) (Yaltırık and Akkemik, 2011).

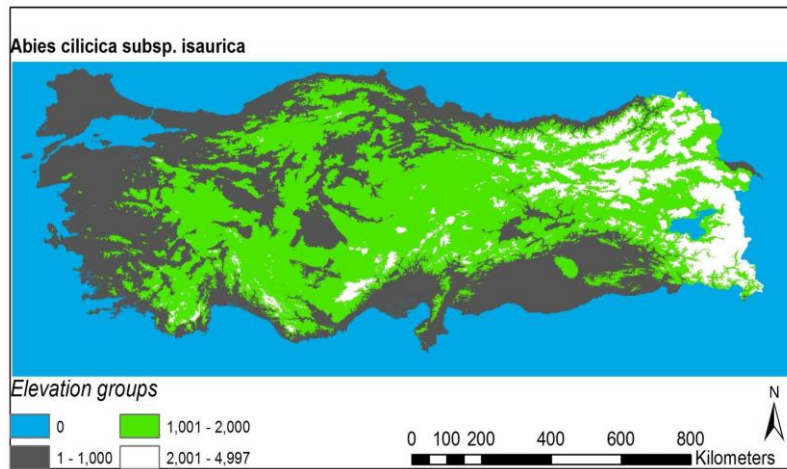


Figure 5. Green areas show the range of *Abies cilicica* subsp. *isaurica* in Turkey

Abies cilicica* subsp. *isaurica* var. *pyramidalis

In this subspecies, branches form narrow angles with the tree trunk and has a compact and pyramidal top. Side branches form also narrow and close angles to

shoots. Needles are shorter, narrower but denser. Lengths of seeds and wings are shorter but wings are narrower (Boydak and Erdoğan, 1999). The distribution of this taxon is shown in Figure 6.

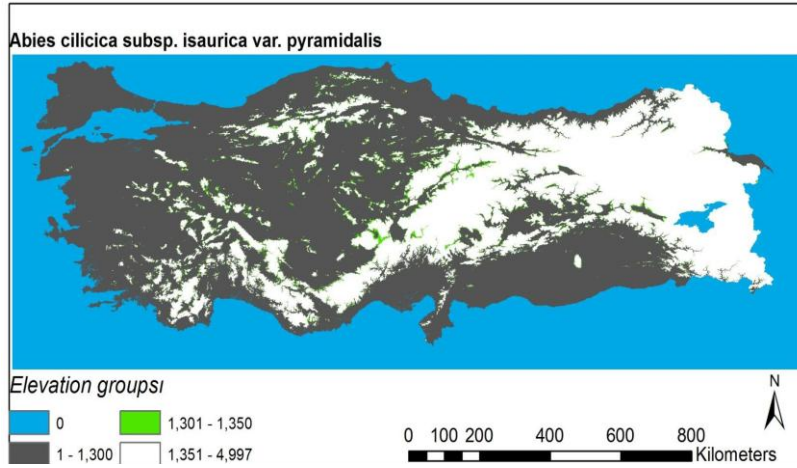


Figure 6. Green areas show the range of *Abies cilicica* subsp. *isaurica* var. *pyramidalis* in Turkey

Result

Natural fir species in Turkey, depending on the species diversity, are widely spread from the seashore to high-altitude regions. Natural fir species of Turkey are also suitable for use in city landscapes both for esthetical and functional reasons. From the aesthetic point of view: evergreen and rough structure, special form, leaf and flower colour, style of vertical-standing cones exhibit very beautiful scenes. On the other hand, natural fir species play functions such as noise-reduction, wind belts, dust suppression, tall fencing as well as timber production. Although Turkey has several different species of natural fir, city landscapes are usually designed with imported fir species and these uses affect the Turkish economy.

In conclusion, the use of natural Turkish fir species in landscape designing for both aesthetical and functional reasons must be increased.

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