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Dede Korkut monument oak (*Quercus infectoria* Olivier) (Kadıköy - Edremit – Balıkesir, Turkey)

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Abstract

An approximately 550 years old Cyprus oak (*Quercus infectoria*) with 10 m height and 6.80 m trunk circumference exists in Kadıköy town of Edremit district in Province of Balıkesir. This oak tree is a valuable natural asset that has the characteristics of monument trees with its dimensional, historical, aesthetic and floristic aspects. This study was undertaken to identify the characteristics of the oak tree, to reveal the regional and national values it transmits and to provide research and conservation about this magnificent natural existence.

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1. Introduction

Turkey is considerably richer than the other countries that are on the same zone and latitude zone as Turkey. Oak genus are rather widespread in Turkey which houses approximately 10 thousand plant species [1]. Balıkesir's Edremit region that has suitable conditions in terms of soil and climate is spectacular with the variety in its flora [2]. Mediterranean climate is dominant in the area that covers the southern slopes of Kazdağları and the shores of Edremit Bay and generally the plant species of Mediterranean Phytogeographical Region are common [3, 4]. Oaks grow in all regions of Turkey. Some species (*Q. petraea*, *Q. frainetto*) can form forests as pure stands. However, other majority of oaks are found mixed with other types of trees. They can grow in all soil conditions. Most of the oaks are formed by species that are fond of light hence they mostly prefer the slopes facing south.

The roots of oaks, a type that produces taproots, develop in depth and towards to the sides. It is easier for the roots to move deeper in rocks with lots of cracks. The roots can go down to 10 meters depth and the oak has a chance to endure the arid periods of Mediterranean climate this way.

The concept of Nature Monuments are used for “naturally grown or planted individual trees or groups of trees in addition to tree mountains and hills, caves, cliffs, canyons, lime and lava accumulations, corals, hot springs, springs, waterfalls and cascades formed spontaneously under natural conditions”. Efforts to conserve these examples by the use of laws have increased in Turkey in recent years as is the case in the whole world [5, 6, 7].

The concept of monument tree has first been used in legal documents with the decisions 25 and 597 of Ministry of

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Culture Cultural and Natural Heritage Conservation High Council and the term has been defined as “trees that have acquired monumental qualifications due to their nature, measurements and other features” [8]”. Monument trees have scientific, historical, touristic, aesthetic and psychological functions [9, 10]. Only the trees that meet the criteria can be considered as monument trees. There are various studies in Turkey regarding the monument trees in different regions [11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21].

The oak tree which is the focus of this study (named “Dede Korkut Oak” by us) is also an oak with longevity carrying psychological effects on human beings with its physical properties that have surpassed the normal dimensions and age of its own kind.

2. Materials and Method

Dede Korkut Oak was identified during the project work related to “monumental trees and that are worth to be conserved” in Edremit region. The physical properties of the tree was determined with the help of tools such as tape measure, increment borer, tree height measures, altimeter, compass, GPS, calipers and cameras. The height of tree was measured by “Suunto Height Meter” and “Vorkampf-Laue” method. While measuring circumference, height of 130 cm was taken as base. Barked measurements were later transformed into measurements without bark and the diameter was calculated. While measuring the diameter of the tree, the circumference 130 cm above ground was calculated and the value was divided by π ($\pi= 3,1416$) in order to calculate the diameter in pectoral height [22].

While measuring the top crown diameter, the radius towards the east, west, north and south of the area in the projection of the crown were measured and they were added. Later obtained value was divided by two to determine the crown diameter of the tree. Top diameter projection was calculated by measuring the diameters in east, west, north and south and by dividing the total by two.

The basal area (cross section) of the tree is the area of the trunk cross section which was calculated from 130 cm up and the value was determined by the formula below:

Tree basal area:

$$ABA = [\text{diameter}/200]^2 \times \pi (3,1416)$$

Volume of the tree was calculated by multiplying the basal area by tree height and later dividing it to 3.

$$\text{Volume (m}^3\text{)} = \frac{ABA \times \text{Height}}{3}$$

The cross section that was measured was multiplied by the height of the tree and the obtained number was divided by 3 in order to get the approximate volume.

The age of the tree was calculated according to the samples taken by “Pressler Increment Borer” and “age estimation method”. The rings in the increment unit were counted with the unit length at least 15 cm taken from 130 cm height from ground. The number of annual tree rings determined by the length of the increment unit was interpolated to the diameter length without bark [23].

GPS was used in order to determine the coordinates and the altitude while presenting the physical geographical conditions of the tree location. Ground was studied with on-site observations and by the help of 1/100.000 scale geology and 1/100.000 scale land maps. For relief conditions, 1/25.000 scale topography map was used. Climate data was obtained from observation results of Edremit meteorology station.

3. Geographical Characteristics of Immediate Vicinity

Dede Korkut Oak is 500 m north of Kadiköy, west of Edremit district centre on a small hill with 125 m elevation on the west of Yumurta Tepe which is separated from lowland ground with approximately 75-80 m elevation. The tree is located in the point that 26°59'35" E longitude and 39°35'48" N latitude intersect. The main rock formation in the area is composed of metamorphic rocks such as conglomerate-metagrovac and siltstone formed in Triassic period. The area three is located is situated on the north side of the shore lowland geomorphologically and it has a wide perspective that consists of south, east and north. The west side is surrounded by the hillsides of Çakal Hill that spread south. There is a thin soil that can be qualified as inceptisol which covers the metamorphic rocks surrounding Yumurta Tepe and its vicinity. The immediate vicinity of the monument tree is rich in terms of natural flora. However, on the west section, there is the Şip Şip Dede pine grove where *Pinus brutia* (Turkish pine) trees are dominant. Other areas are covered by olive groves. The tree is located in the Kumbur Creek which is a tributary of Edremit river basin. There is no water source in the immediate vicinity of the oak tree. Annual rainfall is 680 mm,

annual average temperature is 16°C, the highest temperature is 40,5 °C and the lowest temperature is -7,6 °C .

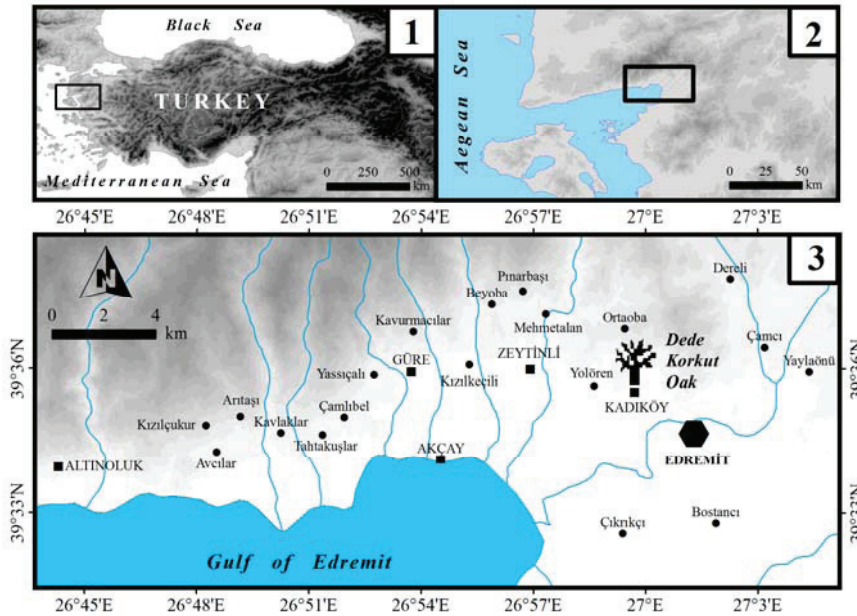


Fig. 1. Location of Dede Korkut Oak

Since Edremit and its vicinity have been used for settlement for centuries, the flora has been destroyed substantially. The natural flora in the flat areas that are lowlands were either significantly destroyed in order to develop agricultural land, to provide firewood/fuel wood and to provide materials to be used in construction or transformed into bushes or olive groves by changing their characters in a context of degradation [24]. Research shows that original flora consisted of Turkish Pine (*Pinus brutia*) and some species of xerophytic oaks (*Quercus infectoria*, *Quercus ithaburensis* ssp. *macrolepis*, *Quercus pubescens*) exist in the lower level which covers the area up to 800 m and black pines (*Pinus nigra*) and some semi-hygrophilous oak species (*Quercus cerris*, *Quercus frainetto*) are inherent in higher altitudes [25, 26].

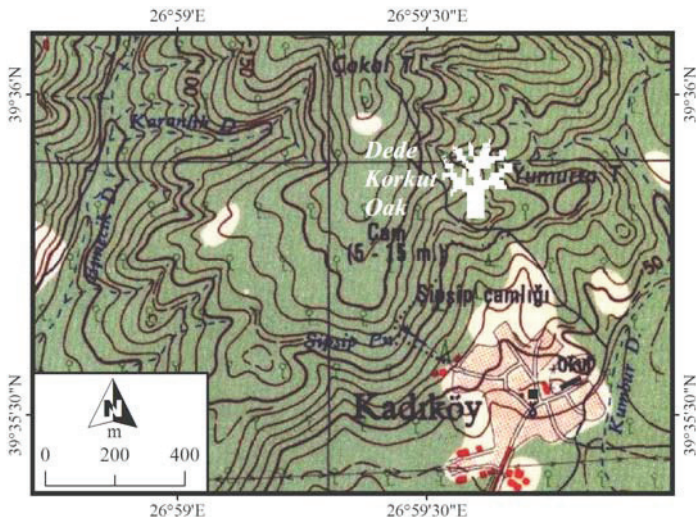


Fig. 2. The location of Dede Korkut Oak in topographic map

Since the wood of oak congregates in the field had better characteristics compared to pine wood they were subjected to natural selection and were destructed much more quickly. Acorn oak whose acorns are economically valuable could survive without much destruction until today. Hence, the oak now found sporadically either in olive groves or in other areas are the remnants of fundamental natural vegetation. Dede Korkut Oak (*Quercus infectoria*) is one of these. Its magnificent silhouette, large trunk and branches that spread to the sides, the ancient oak is both a floristic relic and a historical monument that is respected by the public since it has witnessed the memories of centuries.

4. The Place of Trees and Oaks in History and Culture

Oak is the most common type of tree that is found in every region. It also is the type that covers the largest area among the other forest trees and the forest area made up of oaks is 5.732 thousand hectares. The oaks have a special

place in rural/pastoral culture and life in Turkey. Some oaks provide shade under which tired individuals take a breather in the village square. In their long lives, oaks share the problems of many, listen to their conversations, and witness their joys and heartaches. The life span of the oak is long; hence people come and go but the oak stays there forever. Some oaks provide shade in the backyards of homes for both humans and animals. They are the most significant constant as borders of fields and they keep functioning this way for centuries. The best wood to burn, the best charcoal comes from the oak. The oak provides the most important sections of wooden structures such as beams, pillars, posts and rafters. The shade of the oak is used for shelter in the summer and its wood is used for heat in the winter. Its fruit and leaves are the best food for animals. Its branches are a good place for birds to make their nests. Because of all these, oaks have a respectable place in the human esteem. Oaks have effects and mysterious holds over humans since ancient eras due to their long lives, large bulks, and solidity. Oak is the tree that attracts the lightnings the most during violent thunderstorms. That is related both physically to their colossal sizes and their low resistance to electricity. The oak has different shades of color each season. Brown paint is obtained from its bark and black paint used in the production of ink is acquired from oak gall. The tonic obtained by boiling the bark is used in healing the bruises of the horses caused by shackling.

Trees in the culture of the Turkish world and in the worldview of Turkish people symbolize the ties among people and the ties between nature and human beings. Since individual trees symbolize the oneness/uniqueness of God, these lonely and grand trees have an important place in mythological beliefs. Some trees have always been considered as sacred in Turkish geography according to the ecological characteristics of the area and to the flora. The sacred trees have been fagus, birch and pine in Siberia; hornbeam and poplar in Central Asia and oak and plane tree in Anatolia. In Muslim Turkish geography grand and magnificent trees are named after saints. In some regions, some trees are called “dede trees”. The oak leaf motif on the lace covering the kerchiefs worn on the head in Anatolia represents long life and good wishes. Hence the mother in law presents her sister in law with a kerchief designed with oak motifs.

An element of ancient Turkish communities’ belief systems in Central Asia, the “tree cult” is still important in today’s world. The grand trees with their roots deep underground and branches rising to the skies have always interested human beings since the ancient times. Human beings have always respected and envied the trees that are born, grow and die but live longer than humans in any condition by wishing long lives for themselves just like these trees. It is believed that grand trees are communication channels between the ground and the sky. In the past, the bodies of shamans were always buried under grand trees. As a continuation of this belief, important persons were continued to be buried under grand trees and many examples of this implementation can be seen in Anatolia and Rumelia. In cases where grand trees were not available in the area, a tree was planted after the funeral by the grave.

Trees were considered as sacred in Goktuks and Uighurs. In Shamanism, not only the trees but also the whole forest was considered as a cult. In Turkish sagas, some of the trees were brought into prominence by giving them sacred status by giving the trees exceptional characteristics. Oak tree was accented as sacred by Karay Turks as well. In Katays, each family owned an oak tree which was transferred from father to son as heritage. In Karatism belief, the prayer presented to God by leaning on the oak at Baltatiyemez graveyard was the most acceptable prayer in the eyes of the God. Karays had accepted paying their taxes when the Crimean Khans threatened to cut down the oaks in order to be able to get taxes from them.



Fig. 3. Three states in USA has oak tree in their insigne (on the left), General Directorate of Forestry (in the middle), the oak figure that is the symbol of Zeus (on the right).

Oak is the symbol for strength, might and power. In classical Western mythology, oak is the symbol of Zeus and his sacred tree. In ancient ages, kings used to wear crowns made of oak leaves symbolizing their being

representatives of God on earth. In Celt symbolism, oak represents power.

The tree that is most used as a symbol on earth is the oak. It is used as an emblem in many countries. The emblem of Parma is oak. The insigne of states of Iowa, Georgia and Connecticut is also oak. The logo of Turkish Republic General Directorate of forestry has also oak leaf and acorn in its logo.

The roots of the oak reach very deep under the ground and holds on real good hence oak is the strongest tree against storms. That's why the wise men have used the expression bearing this advice "have your feet planted on the ground as strong as the oak and keep your head up high".

5. General Characteristics of Cyprus Oak (*Quercus infectoria* Olivier)

Oak (*Quercus*) belongs to Fagaceae family. The known species of oak in the world are more than 2000. In Turkey, at least 18 taxons of naturally grown oaks are known. Ten of these (*Q. cerris*, *Q. coccifera*, *Q. frainetto*, *Q. infectoria*, *Q. infectoria* ssp. *boisseri*, *Q. ithaburensis*, *Q. petraea*, *Q. pubescens*, *Q. robur*, *Q. trojana*) can be found in the Province of Balıkesir. In Turkey, there are 747.856 hectares of oak forest and 4.984.149 hectares of coppice oak forest exist.

Cyprus oak is the tree of subtropical climates. It is found in Mid Mediterranean, Balkans, Anatolia and Iran. Although it is generally found in all regions of Turkey other than Central and Eastern Anatolia, it is more common in South Marmara.

Cyprus Oak is more common in areas with Mediterranean climate and with averages of approximately 5°C-6°C winter temperatures. It can endure temperatures at -15°C minimum and 44°C maximum. In terms of annual temperature, areas with 12°C - 16°C temperature are the optimum growth areas. The Cyprus oak, resistant to summer aridity has optimum rainfall values between 700-800 mm.

5.1. Systematics of Cyprus Oak

Kingdom	: Plantae
Subkingdom	: Tracheobionta
Superdivision	: Spermatophyta
Division	: Magnoliophyta
Class	: Magnoliopsida
Subclass	: Hamamelidae
Order	: Fagales
Family	: Fagaceae
Genus	: <i>Quercus</i> L.
Speices	: <i>Quercus infectoria</i> Olivier

Cyprus Oak has a large soil tolerance. It can grow on soil in the range from light acid to light alkaline/basic (pH between 6,5- 8,0). It even grows better in soil that is neutral or shows light acid reaction. Brown soil without lime is the most preferred soil for this oak tree.

Cyprus oak can grow in elevations starting from sea level and up to 1100 m. It has been identified that they have been found in 980 m elevations in Şabla Mountain in Balıkesir.

Cyprus oak can be found in thicket formations. In protected areas they usually are in the form of trees. In optimum growth conditions they can be found individually or as trees in unity.

Their trunks are straight and have a bark full of vertical and deep cracks. Its leaves with many varying dimensions are rather hard. Its lobes are triangular, with raw serrations and nodular. It is rather rich in tannin. Although the leaves are shed in the cold periods of the year, some leaves stay on the tree yellowed out and dry. In regions with long vegetation periods, leaves are not shed and the tree spends the winter in a semi-green condition.

Cyprus Oak has acorns that are 2-3 cm long. Acorn is connected to the branch with a very short stem. Acorn cup is short with a smooth outside surface. Mature acorn appears to be wearing a fuzzy cap that covers less than half of the acorn. Almost two thirds of the acorn is outside the cup. The acorns that fall on the ground will automatically germinate under suitable conditions. On the acorn there are dark red and cube looking formations that are not related to the fundamental properties of the oak acorn and they are the parts called galls. They are called "gals" in local speech meaning swelling, kobak, growth, gullnut. This formation is created by the gall wasp [(Adleria) *Cynips gallae tinctoriae* Olivier]) leaving its eggs among the leaf buds of the plant. Plant surrounds the eggs with materials that are

secreted and in the end dark red oak gall that is the size of walnut is produced. Gal or head is a valuable dye material. It is also used in leather industry since it consists of tannin [10].



Fig. 4: Acorn of Cyprus Oak



Fig. 5: Bark of dede Korkut Oak: Since the tree is very old, the bark has vertical and deep cracks



Fig. 6: Upper side of Cyprus oak leaf



Fig. 7: Lower side of Cyprus oak leaf

Cyprus oaks do not constitute forests even if they are in the forms of trees. Its hard wood is used for heating and for the production of charcoal.

Oak trees conserved as “dede” graves on top of hills in some regions of Balıkesir. Some of them have rather long life spans and hence oaks are traditionally important. In some regions of Turkey, oaks are called “pelit” (acorn trees) and in most parts, the fruit of the oak is called acorn.

5.2. Characteristics of Dede Korkut Oak

It is located on a small hill on slightly sloping ground that is open on east and south. Its trunk is straight and branching starts at 2 meters. It has 4 main branches. Two of the branches are developed vertically while the other two are developed laterally. The branches spread to the four main directions roughly (north, east, west and south). Traces of pruning can be seen in branches at different times. While the eastward branches are in relatively good condition the westward branches show signs of drying and deformation in the leaves. Growth seems to decelerate in the braches on the west parts. Growth/swelling on the trunk can be seen in various dimensionsThe trunk decayed starting from the ground and decay cavity moved upwards by creating a large cavity inside the trunk. The cavity has a width of 2 meters and height of 5 meters. Since no precautions have been taken, decomposition is still effective. Various mushrooms and bugs have been observed in the cavity. It has the risk of continuous human intervention since it is

close to settlement areas and it is on the highway. The growth of height has stopped and it is near a sculpted rock that was apparently used as a coffin rest which shows the connection of the oak with ancient cultures.

Importance: The oak has importance and value in terms of eco tourism and geo-tourism due to its ancient age, impressive appearance and its special place in the culture of the region. Dede Korkut Oak has an important added value to the culture center that carries the same name.



Fig. 8: View of Dede Korkut Oak



Fig 9: Cavity developed in the trunk as a result of decomposing in Dede Korkut Oak and “gall”, “head” or “gal” in Cyprus oak

Monumental value: The only tree with different and extreme growth patterns, the oak carries the appearance of plastic value and has an impact on the image of the settlement by its physical dimensions, visual distinctions and environmental aesthetic all of which contribute to the need and suitability for the oak to be registered and placed under conservation.

Table 1: Properties of Dede Korkut Oak

Scientific name	<i>Quercus infectoria</i> Olivier
Turkish name	Cyprus (Aleppo) Oak
Local name	Meşe (Meshe)
Registered by	Efe, R.; Soykan, A.; Sönmez, S.; Cürebal, İ.
Date	02.10.2009
Code	103128
Province	Balikesir
District	Edremit
Sub-district	Kadıköy
Location	Dede Korkut Culture Center
Geographical coordinates	26°59'35"E -39°35'48" N
Hight	10 m
Circumference	6,80 m
Diameter	2,16 m
Age (approximate)	550 years
Lenght of trunk	2 m
Crown diameter	19,5 m
Width of crown	South-north: 21, East-west: 18 m
Radius of crown	North: 10 m, south:: 11 m, east: 10 m, west: 8 m
Ownership status	Kadıköy town Legal entity
How to get	About 1500 meters from Edremit-Çanakkale highway in the Kadıköy town.

5.3. The place of Dede Korkut Oak among the Monument Oaks in Turke

There are various oaks that are monument trees or with monumental qualities in Turkey. Majority of these oaks are either common oaks or mossy oaks. Dede Korkut Oak has a crucial place among Turkey Monument Oaks due to its age and its dimensions. It has the first place among the other known Cyprus oaks (*Quercus infectoria*) in Turkey both by its age and its trunk periphery (Table 2). When its estimated 550 years of age is considered, it can be argued that the oak was a young sapling while Sultan Mehmet the Conqueror was traveling to Edremit Bay for Lesvos expedition.

6. Results and Suggestions

Trees are born, grow and die like all living beings. Trees can live longer compared to human life. There are trees on earth that are almost 4000 years old from ancient periods. In Turkey trees can not live that long due to the characteristics of the climate zone but there are trees that are more than 10 centuries old. Dede Korkut Oak stands for centuries on earth that belonged to the ancestors of the people who now live there. This oak tree is a nature monument that provides a bridge among the past, the present and the future. The oak has an effect similar to those of ancient and elderly people over the young and reminds the young individuals their history, love for land and respect for ancestors.

Located near Kadıköy settlement of Balikesir province that is in the northwest of Turkey this monumental *Quercus infectoria* resides on a hill with 125 m elevation on the southern slopes of Kazdağları (Mt.Ida) facing Edremit gulf. Kadıköy settlement was mentioned in Ottoman documents dating back to 1530s. Hence, Cyprus oak may be as old as the foundation of the settlement and it is almost a symbol for Kadıköy and a live witness that protects thousands of memories in its. The location of this ancient oak in the garden of Kadıköy Dede Korkut Culture Center is like an excursion terrace that is endowed with the striking view of Edremit Bay. When the majestic and aesthetic appearance and its age surpassing centuries are added to the mix, it is apparent why it was necessary for the

oak tree to be included in the framework of “Code of protection of cultural and natural properties” with issue number 2863. Some precautions are required in order to help the oak live longer. The soil on the point of crown projection should be rearranged in a way so as not to prevent the rainfall from permeating the ground. Also preventing the direct contact of the human beings with the tree is crucial in terms of conservation. It is necessary to clean up the dry branches and to prevent the drying in the branches. The cavity in the trunk should be rehabilitated to stop decaying. Vicinity should be cleaned and landscaped in a manner that will not harm the tree. It is imperative to ban fires under or near the tree, to stop people from driving nails on the trunk and the branches and to ban setting up of swings. It would be highly beneficial to have the maintenance of the tree be organized more carefully and by experts.

Table 2: Monument and Monumental Oaks (ages over 500 years) in Turkey (modified after Asan [10])

Species	Appr.age	Trunk circumference (cm)	Location
<i>Quercus robur</i>	600	9,60	Balıkesir-Gönen-Dereköy
<i>Quercus robur</i>	1300-1400	5,05	Hatay-Bedirge
<i>Quercus robur</i>	950-1000	8,70	Bolu-Saççılar village
<i>Quercus robur</i>	800	7,10	Düzce-Konuralp
<i>Quercus cerris</i>	800	7,00	Kütahya
<i>Quercus cerris</i>	600	6,00	Kütahya
<i>Quercus cerris</i>	550	6,20	Kütahya
<i>Quercus cerris</i>	550	3,84	Afyon-Sandıklı-Akharım
<i>Quercus robur</i>	500	10,99	Istanbul Yıldız Park
<i>Quercus macrolepis</i>	500	4,71	Uşak-Sivaslı-Kureyş
<i>Quercus infectoria</i> (Dede Korkut Oak)	550	6,80	Balıkesir-Edremit-Kadıköy

An informative sign should be placed in the location of the tree to enlighten the public. Also, road signs should be placed on the Edremit-Çanakkale highway to advertise the tree to attract more people to the location. Especially it must be emphasized that this oak tree is above the regular norms for its kind with its age and dimensions and that it has longevity to ensure the building of a bridge between the past and the future.

Unfortunately, this noble and magnificent tree which is not targeted for receive any conservation efforts is restrained in a narrow location and is now facing pathological problems. It is our biggest wish for this monumental Cyprus oak in Edremit region to be provided with ample precautions and required maintenance in order to allow its real functions to surface.

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