



Threat status of a relict endemic species (*Flueggea anatolica*) in Turkey

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Abstract

Genus *Flueggea* Willd., included in Phyllanthaceae, is represented by only *F. anatolica* Gemici in Turkey, while it comprises 15 species from all over the world. This relict endemic species is distributed in a limited area extending from Mersin towards Adana and Kahramanmaraş provinces in South Anatolia. *F. anatolica* is under threat, mainly due to the road construction, forest fire, illegal cutting and grazing pressure. IUCN red list categories are widely accepted global approach especially for evaluating threatened plant and animal species. In this study, threat status of *F. anatolica* was assessed according to IUCN criteria and a new threat category was recommended.

Key words: *Flueggea anatolica*, IUCN, Relict endemic, Threat status, Turkey

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Türkiye için relik endemik olan bir türün (*Flueggea anatolica*) tehlike durumu

Özet

Phyllanthaceae familyasında yer alan *Flueggea* Willd. cinsi, dünyada 15 tür ile temsil edilirken, Türkiye'deki tek türü *F. anatolica* Gemici'dir. Bu relik endemik tür Mersin'den Adana ve Kahramanmaraş illerine uzanan sınırlı bir yayılış alanına sahiptir. *F. anatolica* (Kadıncık Çalısı) genel olarak yol yapımı, orman yangını, kaçak kesimler ve otlatma baskısından dolayı tehlike altındadır. IUCN kırmızı liste kategorileri özellikle tehlike altındaki bitki ve hayvan türlerinin değerlendirilmesinde küresel bir yaklaşım olarak kabul görmektedir. Bu çalışmada *F. anatolica*'nın tehlike durumu IUCN kriterlerine göre değerlendirilmiş ve tür için yeni bir tehlike kategorisi önerilmiştir.

Anahtar kelimeler: *Flueggea anatolica*, IUCN, Relikt endemik, Tehlike kategorisi, Türkiye

1. Introduction

Recently, according to the Angiosperm Phylogeny Group classification, Euphorbiaceae (sensu lato) was divided into three families (Euphorbiaceae (sensu stricto), Phyllanthaceae and Picramniaceae) (APG II, 2003). The pantropical family Phyllanthaceae segregated from Euphorbiaceae (sensu lato) contains about 2000 species in 59 genera in the world (Kathriarachchi et al., 2005). The genus *Flueggea* currently included in Phyllanthaceae is an old world genus comprises 17 species from all over the world (Serdar et al., 2008). Many member of this genus are relict. Among them, the widest distribution area belongs to two species of the genus (*Flueggea virosa* (Roxb. ex Willd.) Royle and *F. suffruticosa* Baill.). *F. tinctoria* (L.) G.L.Webster is only one species occurs in Europe (Webster, 1984). *F. anatolica* is recently described local endemic species from Turkey (Gemici, 2000). It is closely related to *F. virosa* but differs from it in having the undivided (not 3-branched) pistillode, staminate flowers up to 13 per glomerule (not 20-40) and 1-3 (not 3-10) pistillate flowers (Gemici, 2000). *F. anatolica* is a relict endemic species for Turkey, such as *Liquidambar orientalis* Mill. and *Ajuga reptans* Briq. (Gemici and Leblebici, 1995).

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The important threats for *F. anatolica* are the road construction, fire, illegal cutting and grazing. One of the occupation areas of *F. anatolica* in S. of Andırın town, around of Torun village, 570 m, has been wiped out for the road construction around of the highway between Andırın and Kadirli. 50 individuals were destroyed in this area (Figure 2).

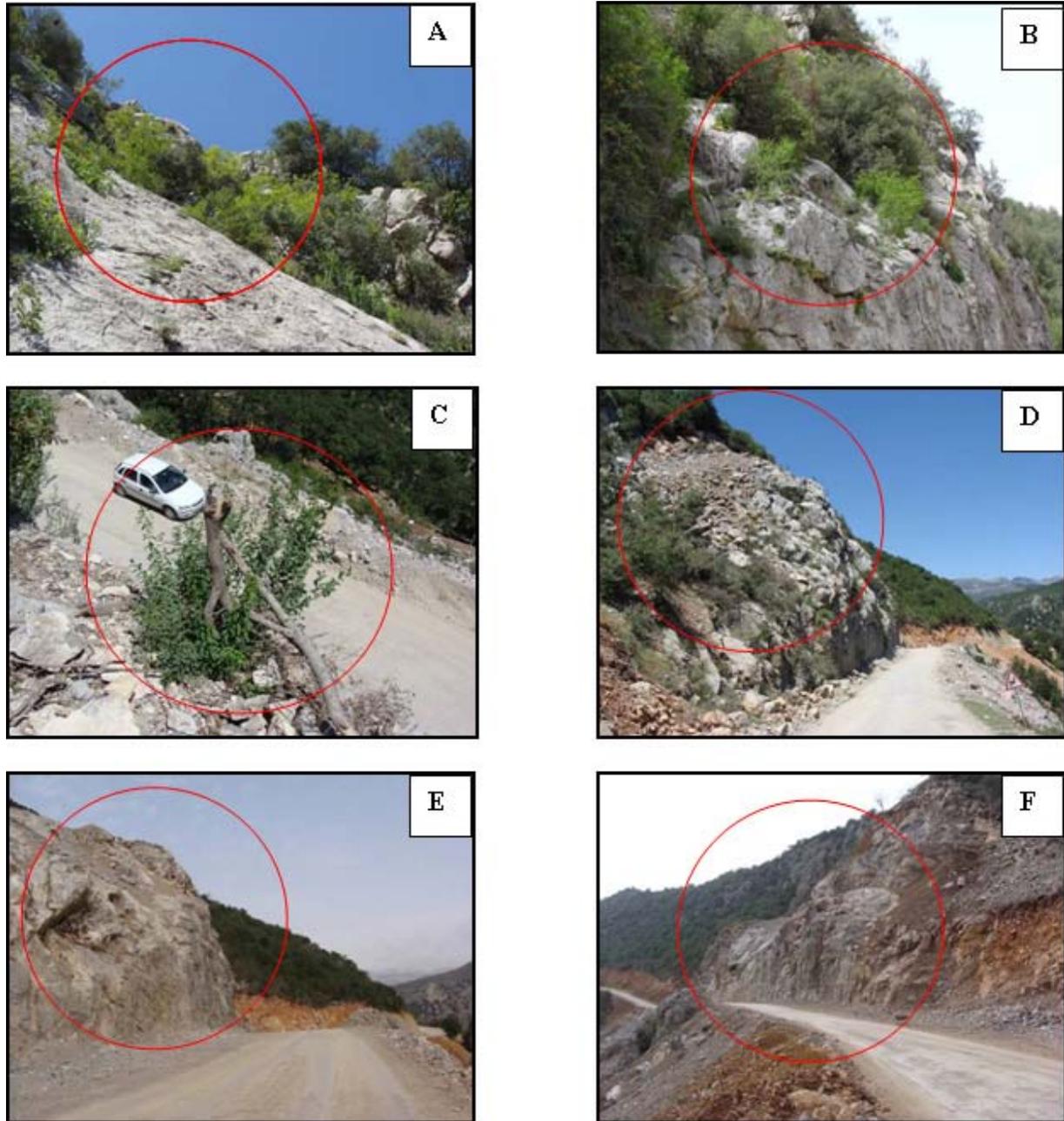


Figure 2. One of the destroyed occupation areas of *F. anatolica* around of the highway between Andırın and Kadirli. A-B-C-D: *F. anatolica* individuals before the road construction. E-F: no individuals after the road construction.

The most important threat in the distribution area of the species in Kozan is forest fire. A forest fire has destroyed the 3.5 ha in Kütükler district, Gedikli village, Kozan on 17 September 2007. This region is one of the occupation areas of *F. anatolica* (Figure 3).

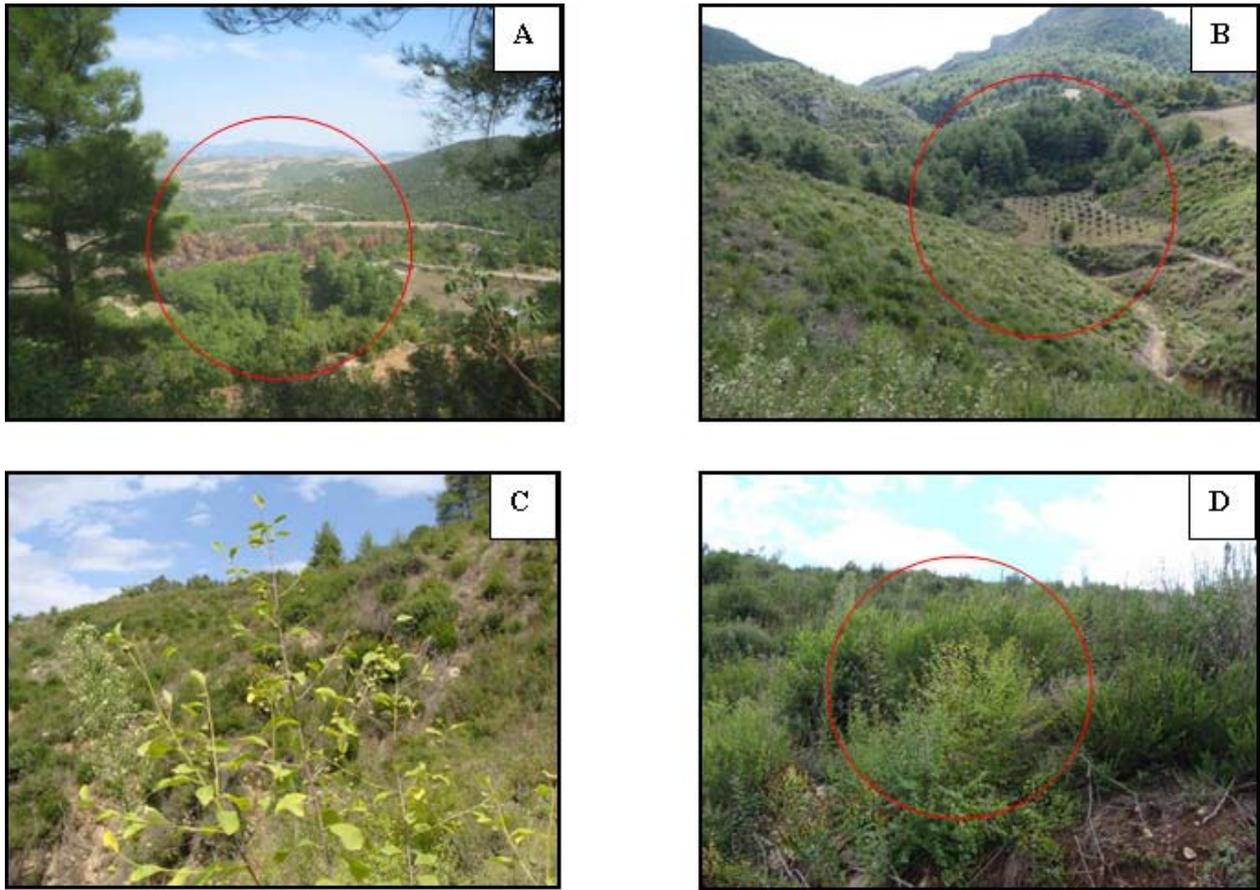


Figure 3. An occupation area of *F. anatolica* affected by a forest fire in Kütükler district, around of Tölek (Yeşildere). A: the burned area. B: the area cleaned up after the fire. C-D: an individual of *F. anatolica* in the cleaned area.

Other threats are illegal cutting and grazing in Kadıncık valley (Tarsus). Gemici and Leblebici (1995) reported that, branches of this species were used for building animal barn by the local people around of Kadıncık valley (Figure 4).

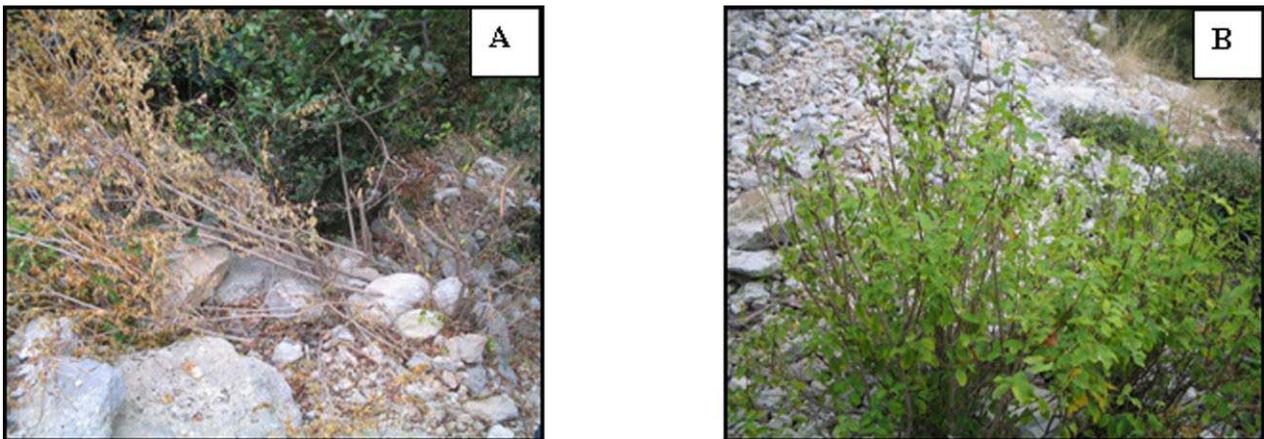


Figure 4. *F. anatolica* individuals in Kadıncık valley. A: an individual affected by illegal cutting. B: an individual affected by grazing.

3.3. In-situ and ex-situ conservation efforts

F. anatolica has been propagated by seeding and cuttings in Tarsus Forest Nursery with a project conducted by Eastern Mediterranean Forestry Research Institute (Figure 5). There are still lots of individuals grow in this nursery.

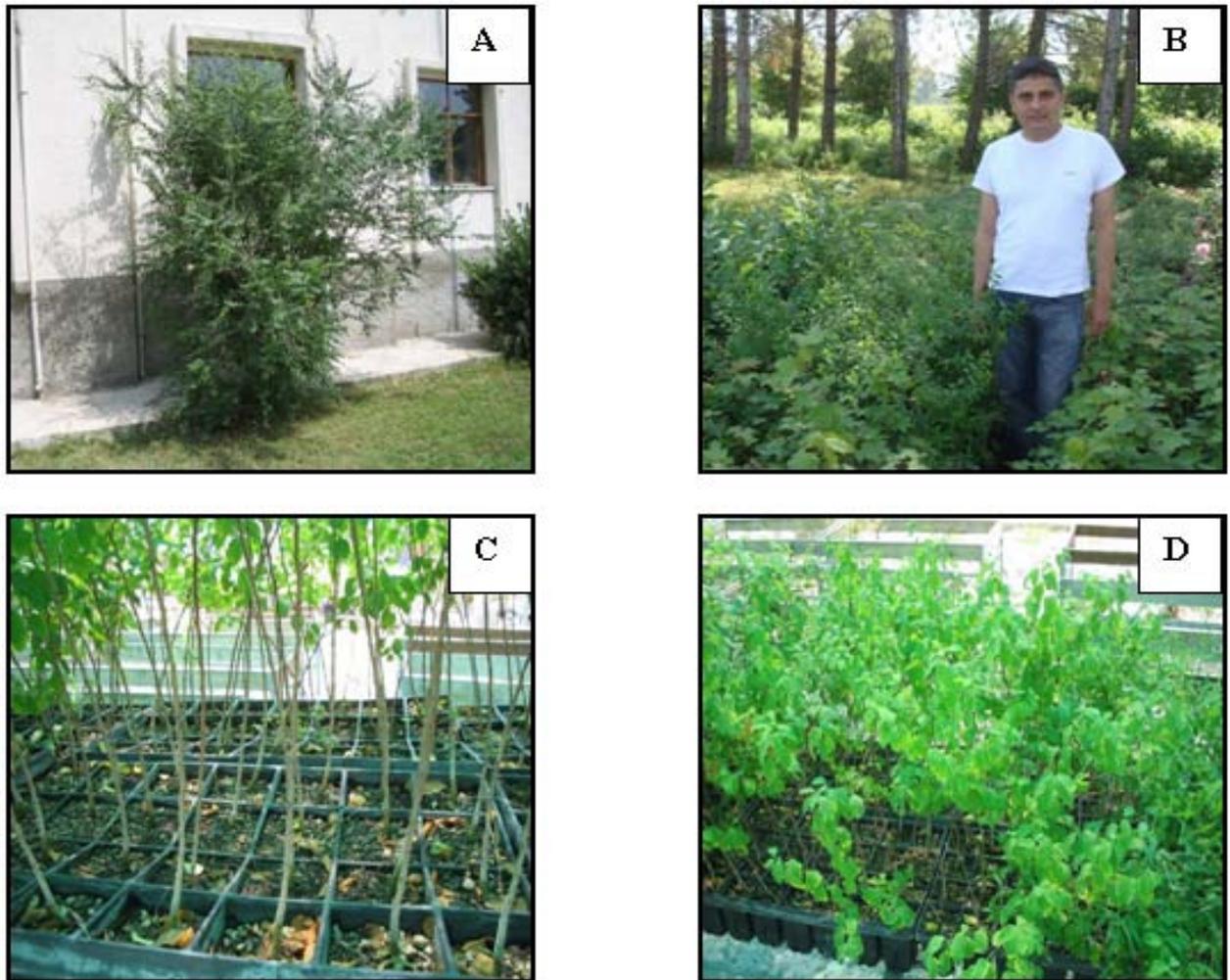


Figure 5. *F. anatolica* in Eastern Mediterranean Forestry Research Institute and Tarsus Forest Nursery. A: a planted individual. B-C-D: saplings.

Fencing of many distribution areas of the species served its *in-situ* conservation. But there is still no official conservation status in these areas. One of the occupation areas of the species in Kadıncık valley is located in HES II Dam. This also contributes to the *in-situ* conservation. *F. anatolica* is well known as a rare and endemic species in Kadıncık valley by the local people. The most common Turkish name of the species is Kadıncık çalısı. But this species is named as Delinar by the locals in Tarsus region. The awareness creation about the species is required in both Kozan and Adıran towns, as well.

3.4. IUCN assessment

Güner and Zielinski (1998) suggested that threat category of the species as EN (Endangered). Later, Ekim et al. (2000) recognised its threat category as CR (Critically Endangered). But with the help of new data from the field surveys, its threat category was re-assessed, according to IUCN criteria.

3.4.1. Criterion A: Declining population in the past or future?

Although disturbances from the road construction, forest fire and illegal cutting affected population numbers in the past, there is no adequate data to be able to estimate the rate of population decline. Therefore, it is not possible to estimate the rate of decline.

3.4.2. Criterion B: Small distribution, population fragmented or in few locations, and continuing decline or fluctuation?

With the help of new data obtained from our recent studies, the extent of occurrence was calculated as 2.108 km². Therefore the Endangered threshold for extent of occurrence is met (EOO <5000 km²) (EN B1). *Flueggea anatolica* has 3 subpopulations in Tarsus, Kozan and Adıran towns. In these three locations, individuals of each three

subpopulations have been affected by different threats. The most serious plausible threats for individuals of *F. anatolica* are the road construction in Andırın, the forest fire in Kozan and the illegal cutting in Tarsus. Thus the locations of this species can be counted as 3 (EN B1a). The quality of the species' habitat is declining through road construction, forest fire and illegal cutting. Because of the ongoing habitat degradation, these population declines can be expected to continue, unless some remedial action is taken (EN B1b(iii, v)). So, the species qualifies for Endangered under criterion B (EN B1a+b(iii, v))

3.4.3. Criterion C: Small population size and decline?

Total mature and healthy individual number of the species counted as 1350. Therefore the Endangered threshold for population size is met (mature individuals < 2500) (EN C2). Also extreme fluctuations were observed in number of mature individuals. This species is represented by only 50 individuals in Kozan, while more than 1000 individuals were counted in Tarsus. Maximum individual numbers are 20 x higher than minimum individual numbers (ENC2b).

3.4.4. Criterion D: Very small or restricted populations?

Mature individual numbers more than 250, so this criterion can not be applied.

3.4.4. Criterion E: Quantitative analysis?

A quantitative analysis has not been carried out. As a conclusion, threat category of the species can be recognised as EN [B1a+b(iii, v); C2b]. This relict endemic species is distributed in a limited area extending from Mersin towards Adana and Kahramanmaraş provinces. Gemici and Leblebici (1995) reported that, the species was represented by few individuals in nearly 1 ha in Kadıncık valley. Later, Ok and Avşar (2007) determined more than 100 individuals in the same area. Also, Ok and Avşar (2009) observed 136 individuals in Andırın and less than 50 individuals in Kozan in the new areas. After these studies, the first author recorded more than 150 individuals around of Çağşaklıluk district in Andırın as the new area in 03.09.2009. Recently, lower parts of Kadıncık valley were studied in detail and more than 1000 mature and healthy individuals were reported in 19.02.2009. But in these regions, it is predicted that there are more individuals. With the new distribution areas, this species has more wide areal than known previously. It is clear that new occupation areas of the species will be found in appropriate habitats in Eastern Mediterranean Region of Turkey. Current individual numbers, habitats, threat factors, observation time of *F. anatolica* in Andırın, Kozan and Tarsus towns are shown in Table 1.

Table 1. Individual numbers, habitats, threat factors and observation time of *F. anatolica* in Andırın, Kozan and Tarsus towns.

Locations	Mature individuals	Habitat	Threat	Observation time
Andırın	about 300	rocky limestone slopes	road construction	2006-2010
Kozan	nearly 50	<i>Pinus brutia</i> forest, degraded macchie, among <i>Buxus bleaica</i> formation, rocky limestone slopes	forest fire	2003-2010
Tarsus	more than 1000	colloviaal soils, among <i>Ceratonia siliqua</i> macchie	illegal cutting, grazing	2002-2010
total	about 1350			

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