



## Flora of Dedegül Mountain and Its Effects to Agricultural Production of Lakes Region

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### Abstract

Dedegül mountain has an important plant gene center and microclimatic effects. The most effective factor in formation of these features is seen as the floristic richness and topographical structure of Dedegül Mountain and environs. This paper emphasizes the relationship between the Dedegül Mountain and the agricultural production in the region.

It is known that the ancestors of agricultural plants and the agricultural plants grown in a geographical area are closely related to the wild flora. As a parallel to the Turkish Flora, the Lakes Region also has an important plant diversity. Although the flora of Antalya is not fully known, but it is estimated it has 3000 vascular plant taxa. It is known that Isparta carries 2300 (as 600 endemics) and Burdur 1600 (as 450 endemics) taxa. It is stated in the scientific sources that the Mediterranean Region is the center of the differentiation of some genera from the four important families of medicinal and aromatic plants: Lamiaceae / Labiatae, Apiaceae / Umbelliferae, Rosaceae and Papaveraceae. Production and diversity of coriander, cumin, fennel in Burdur; carrot in Isparta; dill, radish, turnip; poppy, apple, fat rose, strawberry, blackberry, quince, deer apple, hawthorn in Lakes Region are very high. The vilayets have also a significant potential in harvested wild plants. Sütçüler thyme (*Origanum minutiflorum*), rosehips (*Rosa dumalis* subsp. *boissieri* var. *antalyensis* etc.), sage (*Sideritis*, *Salvia*, *Nepeta* spp.) are some of these. Secret of this success in the agricultural products of the Region is many ecological factors belong to Dedegül Mountain rows like Bozburun, Sultan, Beyşehir Lake, Kızıldağ, Köprülü Kanyon, Kovada Lake National Parks and Eğirdir Lake. which is the extension of this mountain.

**Keywords:** Dedegül Mountain, Gene center, Agricultural production, Lakes Region

### INTRODUCTION

“Dedegül” is the name of a mountain range among Yenişarbademli, Aksu, Eğirdir, partly Sütçüler (Isparta) and Beyşehir (Konya) districts. Beyşehir Lake on one side and Kızıldağ National Park and Eğirdir Lake on the other. It is the highest mountain in the Lakes Region. Dedegül Tepe is at the height of 2992 m altitude. Other peaks; Kartal peak is 2983 m, Karçukuru peak is 2932 m high [1 and 2].

Dedegül Mountain is a mountain range 15-18 km wide between the Beyşehir and Eğirdir Lakes to the east of the Lakes Region, extending about 60 km in the north-south direction. Beyşehir is the eastern border of the area and it forms Büyükçay’s arms, which are poured into this Lake. The west border is Davras Mountain, Aksu Creek and the basin. It is surrounded by Beyşehir Lake, Kurucaova town, Dumanlı village and Yeşildağ city in the east; Şarkikaraağaç city, Sultan Mountains, Eğirdir Lake, Aksu in the north; Sarp Mountain in the west; Köprüçay valley and Emerdin mountain, Sütçüler city, Kesme and Derebucak towns in the south. Bird flight in north-south direction, the field is generally mountainous and rugged rocks. Geological structure of it is tectonic in general. Its rocks are generally serpentine, volcanic and limestone. The area: 138568 ha, Coordinates: 31,25°E, 37,74°N. Altitude is between 820-2992 m. It is mostly located in vilayet Isparta (Şarkikaraağaç, Gelendost, Eğirdir, Beyşehir, Yenişarbademli, Aksu, Sütçüler cities) and partially in Konya province (Beyşehir district). No protection status of the area. May be harmed.

Zindan Cave (in Aksu city), Pinargözü Cave (in Yenişarbademli, 16 km in length) are the most attractive caves of Türkiye. Rock type and karstic structure have been very influential in the formation of caves and boulders. It is the richest area of the Lakes Region in terms of vegetation and animal diversity. The mountain was selected as one of

Türkiye’s 122 Important Plant Areas [3 and 4]. At the same time, it is one of the Important Nature Areas of Türkiye [2]. These ones are an international project and book names. The important fresh water resources of the region are the effects of this mountain. Especially Karagöl (in 2350 m) is an interesting karst formation. This lake, which is fed with snow water, has its base paved and its edges are clay. The waters leaking from the bottom of this lake are transformed into important rivers on the side of Antalya and these waters are mainly used for agricultural production.

Dedegül peak is integrated with the Anamas mountains. Cedar and larch forests dominate up to 2000 m. It is one of the areas where the nomads are settled and lived their migratory traditions. The Çayır, Barak, Sorkun plateau and the valleys are important pedestrian precincts. Mountaineering festivals are being held on the Melikler plateau for 19 years [1]. It is thought that this mountain flora is important in its agricultural structure due to its fauna, rock structure, climatic effects. This article has been prepared for this purpose.

### MATERIAL AND METHOD

The voucher herbal materials of the work have been collected by the author at various dates since 1994. Almost 1200 specimens were collected from the area. After being made according to the techniques of addition, pressing and drying, they were bonded on herbarium cartons and placed to **GUL Herbarium** which is in the Department of Biology (Isparta) of Süleyman Demirel University, Science and Literature Faculty. Identification of the specimens were made by the author by help of Flora of Turkey and the East Aegean Islands [2, 4 and 5]. Findings were obtained within the scope of scientific projects carried out on various dates. These projects were later transformed into scientific publications and reports [6, 7, 8, 9, 10, 11, 12, 13, 14].

The flora and vegetation that should be monitored and endangered are determined for these studies. The floristic, topographical, climatic and geological structures of the area has been interpreted in order to explain the effects on the agriculture of the local people. The satellite image of the study area is shown on Map 1.

No record of plants collected from the field in the paper. A list of the taxa threatened on a global scale, on a European scale or throughout the country, and the hazard categories were determined according to the literature [2, 3]. However, the collection of plants has been done by author and from general diagnosis books [2, 4 and 5]. The endangered taxa with little or no distress in the danger category have not been added to the list of mountains. They must be added to the list.

Effects to agricultural production in the region of Dedegül Mountain was done by the author's interpretation. After the flora and vegetation of the mountain and the region were revealed, the geological and geomorphological structures was compared with the plants dominant in the agricultural production of the Lakes Region and the results were interpreted.

The flora of the mountain, the vegetation and the threats on its natural geological and topographic structures have been determined by observations in the field. Some suggestions have been made to protect this mountain against the identified threats.



Map 1. View of research area from SATellite (from <https://earth.google.com/web>).

## FINDINGS AND DISCUSSION

There are different ecological habitats in Dedegül Mountain. These habitats have been an important factor in the development, spread and diversification of various plants. Dedegül is the richest mountain in terms of floristics of the Lakes Region. Flora of it is not exactly known. According to our work called "Flora of Isparta"; this mountain is home to at least 900 vascular plant taxa. Approximately 650 of these are endemic. 40 of the endemics are only grown on the mountain of Dedegül. So this mountain is the only address in the world of the plant taxa.

*Pinus brutia* as a local community, *Platanus orientalis* and *Tilia platyphyllos*, *Populus* spp. along the Aksu stream are widely distributed near the village of Kasımlar. The high parts of the Dedegül Mountain are quite rich in plant diversity. Especially in recent years, linden has been grown in urban parks. Most of the people need linden tea. *Populus nigra* and other varieties are grown in abundance in Lakes Region for the purpose of lumbering. Crops can be cut in a maximum of 20 years.

### 3.1. Plant taxa specialised to the mountain and its environs:

*Aubrieta anamasica*, *Alyssum cephalotes*, *Hesperis ozcelikii*, *H. pisidica*, *Ranunculus gueneri*, *Delphinium gueneri*, *Geranium cinereum* subsp. *subcaulescens* var. *pisidicum*, *G. glaberrimum*, *Erodium pelargoniflorum*, *Minuartia umbellulifera* subsp. *salbacica*, *Saponaria pamphylica*, *Silene guerbuezii*, *S. caramanica*, *S. caryophylloides* var. *echinus*, *S. cariensis*, *S. isaurica*, *S. phrygia*, *S. ruscifolia*, *S. lycaonica*, *S. oreades*, *S. pharmaceifolia*, *S. capillipes*, *S. akmaniana*, *S. deliculata* var. *pisidica*, *Minuartia anatolica* var. *phrygia*, *Herniaria pisidica* *Astragalus sorgerae*, *Trigonella polycarpa*, *Sempervivum ispartae*, *S. pisidicum*, *Rosa dumalis* subsp. *boissieri* var. *antalyensis*, *Eryngium trisetum*, *Centaurea kizildaghensis*, *Helichrysum chasmolycicum*, *Ballota cristata*, *Nepeta plinux*, *Lamium pisidicum*, *Polygala pruinosa* subsp. *megaptera*, *Verbascum adenocarpum*, *V. sorgerae*, *V. pumilum*, *V. spodiotrichum*, *Rindera dumanii*, *Valeriana oligantha* and *Crocus asumaniae*.

### 3.2. The narrow-spread taxa that grow on the Dedegül mountain but also grow in other areas:

*Hesperis matronalis* subsp. *cilicica*, *Thlaspi papillosum*, *Papaver strictum*, *Matthiola montana*, *Isatis cappadocica* subsp. *alysifolia*, *Hypericum monodenum*, *Silene amana*, *S. sipylea*, *S. leptoclada*, *S. tunicoides*, *S. cryptoneura*, *S. cariensis*, *Dianthus eldivanus*, *Saponaria syriaca*, *Paronchia davisii*, *Geranium lasilopus*, *Genista burdurensis*, *Trigonella lycica*, *Astragalus barbarae*, *Astragalus panduratus*, *A. sparsipilis*, *Cephalaria lycica*, *Sempervivum brevipulum*, *S. ispartensis*, *Sedum hispanicum* var. *planifolium*, *Kundmannia syriaca*, *Helichrysum heywoodianum*, *Centaurea germanicopolitana*, *Euphorbia isaurica*, *Verbascum pinardii*, *V. cilicicum*, *Sideritis leptoclada*, *Lamium lycium*, *Thymus samius* and *Asyneuma isauricum*.

*Saponaria pamphylica* is a threatened species on European scale. It grows abundantly in Kızıldağ National Park and near Beyşehir Lake. It is an endemic of the Lakes Region. Damage to the mountain is a threat to these species.

Although *Silene ruscifolia* were registered from Kayseri (Pınarbaşı), Sivas and Erzincan provinces, it was not found in there by us, but there was in a small area of Gelendost (Isparta).

*Silene caryophylloides* has very good variation in the mountain.

*Sedum hispanicum* var. *planifolium* was registered from Kütahya. Dedegül Mountain is the area of second spread. In the mountain, it is growing the best. *Sempervivum brevipilum*, *S. ispartensis* are also endemics to the region. It grows mostly on Dedegül Mountain. It is spread by birds. There are many ornamental plants of *Sedum* genus and relatives.

*Minuartia umbellulifera* subsp. *salbacica* was registered from Denizli. However, varieties of the species are growing abundantly in the mountain.

**3.3. Plant taxa in the VU (at risk) category in the mountain:** *Acer hyrcanum* subsp. *sphaerocaryum*, *Asphodeline turcica*, *Bupleurum davisii*, *Echinops onopordum*, *Eremopoa attalica*, *Erodium pelargoniflorum*, *Gaudiniopsis macra* subsp. *micropyroides*, *Glycyrrhiza asymetrica*, *Hypericum ternatum*, *Iris pamphylica*, *Muscari muscarimi*, *Omphalodes ripleyana*, *Ricotia varians*, *Silene delicatula* subsp. *pisidica*, *Stachys antalyensis*, *Trigonella pamphylica*, *Valeriana oligantha*, *Veronica panormitana* subsp. *baradostensis*, *Ranunculus gueneri* and *Rosa dumalis* subsp. *boissieri* var. *antalyensis*.

**3.4. Plant taxa in the CR (Critical) category in the mountain:** *Stachys chamosericea*.

**3.5. Plant taxa in the EN (Endangered) category in the mountain:** *Campanula antalyensis*, *Cerastium pisidicum*, *Crocus asumaniae*, *Globularia trichosantha* subsp. *longisepala*, *Herniaria pisidica* and *Stefanoffia insoluta*.

It is a field where the Mediterranean enclaves (vegetation with foreign origin) are seen in the region. For this reason, it is a mountain that has links to other regions in terms of geological structure and plant formations. There are a large number of monumental trees in the area (registered as Beyçamı by the TR. Forestry ministry), and even 600-800-year-old larch forests or remains. *Quercus vulcanica* and *Abies cilicica* subsp. *isaurica* are also present as enclaves. Most of these trees are monumentals. It is a rare plant from Tertiary (3rd time) that can reach to the day. For this reason, they are both a relicts and endemics. Along the canyon (Kapiz) is an enclave of European Siberian taxa. There are small remains from these enclaves in the upper parts of the canyon.

According to our work; Dedegül mountain is gene center of *Rosa* genus and *Rosa dumalis* subsp. *boissieri* var. *antalyensis*. *R. dumalis* in the area, a rosehip species, is the highest quality rosehip species in Türkiye. Vitamin C in *R. dumalis* growing the mountain is above of world standards. Worldwide, the maximum rate of vitamin C was 4 mg / 100 g, while in *R. dumalis* it was 4.2-4.5 mg / 100 g. The other components are also more qualified than the other rosehips. This kind of farming industry should be established. It shows a lot of *Rosa* species variation. There are almost 60 *Rosa* genotypes belong to 12 species in the mountain [12]

We have to think the Dedegül Mountain together its surrounding. Especially from Bozburun Mountain and Köprülü Canyon National Park, we can not think separately from the Beyschir Lake National Park. This area has been declared by the state largely as national park, protected area and so on. Among the other bulbous and tuberous plants that we have cultivated, there are Şakayık, Ayıgülü (*Paeonia mascula*), Kardelen (*Galanthus gracilis*, *G. elwesii*), Boynubükük, Gölsoğanı (*Leucojum aestivum*), Ağlayangelin (*Fritillaria* spp.), Çiğdem (*Crocus*, *Colchicum* spp.), Lale (*Tulipa* spp.), Süsen, Zambak (*Iris* spp.), Tükrikotu (*Ornithogalum* spp.) and are also abundant and varied in this mountain. Members of the Crassulaceae family are particularly important for the *Sedum* and *Sempervivum* genera, as well as *Populus* and *Salix* genera.

*Origanum minutiflorum* is one of the endemic species of the region and is known as Sütçüler kekiği (Aş kekiği, Çorba kekiği, Tota kekiği). It is the most important plant of Türkiye's exports. The volatile oil content is about 3% and the use of oil components is very convenient.

*Paeonia mascula* is a very valuable ornamental plant. At International EXPO 2016 fair held in Antalya, this plant was preferred instead of flowers as a symbol of flowers and children.

Onions of *Galanthus gracilis* and *G. elwesii* are very valuable in economy. As a taxonomic, *Galanthus* species are often mixed with *Leucojum aestivum* species. All three species are exported to Europe. These species are also produced by the villagers of mountainous areas and their onions are sold. However, not producers, usually win European traders in trade.

The onions are sold by 5-6 TL/kg from Türkiye to European traders. In Europe, the bulbs are grown, they are sold individually and in high price in the form of flowering pots. It is also understood that these plants are used for the production of organic medicinal drugs. Children paralysis are at the beginning of these diseases. Several active substances, especially galanthamine from the genus *Galanthus*, are isolated and sold as organic drugs for a multitude of diseases. Due to the extreme disintegration, the natural distribution areas within the territory of Yenişarbademli are protected by the state and dismantled. For this reason, production studies have been started. If these plants are produced, there is no market strain. European states are the most important market. The floristic characteristics of the area are given in Table 1 as a comparison with their surroundings.

**Table 1.** A comparison of the floristic studies performed in and around the study area.

\*: The order of first three families involving the most taxa; \*\*The order of first three genera involving the most taxa; \*\*\*: It has been determined by removing it from the related publication. **Med. el.:** Mediterranean element; **Ir.-Tur. el.:** Irano-Turanian element; **Avr.-Sib. el.:** Euro-Siberian element.

Floras of Research Areas	Total Taxa	Endemism Ratio %	The biggest 3 families*	The biggest 3 genera**	Med. el. %	Ir. Tur. el. %	Avr.-Sib. el. %
Kasnak Oak Nature Protection Area (Isparta) [14]	442	15,61	Fabaceae, Asteraceae, Lamiaceae	<i>Trifolium, Astragalus, Silene</i>	27,38	9,28	6,33
Yaylabel (Isparta)[16]	271	13,65	Asteraceae, Fabaceae, Lamiaceae	<i>Silene, Astragalus, Centaurea</i>	25,46	8,86	5,54
Dedegül Mountain (Isparta-Konya)[17]	824	18,69	Asteraceae, Fabaceae, Caryophyllaceae	<i>Silene, Astragalus, Ranunculus</i>	18,57	10,92	4,73
Sütçüler (Isparta)[7]	587	26,20	Fabaceae, Asteraceae, Caryophyllaceae	<i>Silene, Trifolium, Ranunculus</i>	29,0	15,6	6,2
Aksu (Isparta)[6]	658	25,20	Asteraceae, Lamiaceae, Caryophyllaceae	<i>Silene, Veronica, Astragalus, Centaurea</i>	23,1	11,4	9,2
Barla Mountain (Isparta)[18]	645	17,05	Asteraceae, Fabaceae, Lamiaceae	<i>Astragalus, Centaurea-Trifolium- Silene-Euphorbia, Veronica</i>	21,65	11,92	3,71
Bozburun Mountain (Antalya-Isparta-Burdur)[19]	645	16,12	Fabaceae, Asteraceae, Lamiaceae	<i>Silene, Trifolium, Ranunculus</i>	32,1	7,9	5,1
All of Burdur vilayet[11]	1580	25,31	Asteraceae, Fabaceae, Lamiaceae	<i>Astragalus, Verbascum, Centaurea</i>	-	-	-
Kızıldağ National Park (Isparta) [20]	786	15,72	Asteraceae, Fabaceae, Rosaceae-Poaceae	<i>Ranunculus, Allium, Veronica</i>	16,76	17,56	4,59
Davras Mountain (Isparta)[21]	415	25,80	Fabaceae, Asteraceae, Brassicaceae	<i>Silene, Veronica, Astragalus</i>	35,0	15,6	5,5
Kovada Gölü National Park (Isparta)[22]	367	15,25	Fabaceae, Asteraceae, Brassicaceae	<i>Silene, Trifolium, Astragalus</i>	21,52	10,62	4,90
Gölcük Lake (Isparta)[23]	227	28,20	Fabaceae, Caryophyllaceae Asteraceae	<i>Astragalus, Silene, Vicia</i>	21,1	17,6	6,2
Kovada Arboretum (Isparta)[15]	350	12,3	Asteraceae, Fabaceae Lamiaceae	<i>Galium, Silene, Ranunculus</i>	28,8	14,4	6,8
Beyşehir Lake and its Environs (Konya) [24]	-	10,12	Fabaceae, Poaceae, Asteraceae	<i>Trifolium, Astragalus, Trigonella</i>	18,32	12,40	5,06
Köprülü Kanyon National Park(Antalya-Isparta) [12]	707	32,50	Lamiaceae, Fabaceae, Asteraceae	<i>Ranunculus, Veronica, Geranium</i>	30,97	10,46	07,07
Yeşildağ-Kurucuova (Konya)[25]	512	11,52	Poaceae, Asteraceae, Brassicaceae	<i>Astragalus, Trifolium, Silene</i>	20,89	15,13	4,48
Sultan Mountains (Afyon-Isparta-Konya[3 and 26])	587	14,0	Asteraceae, Fabaceae, Poaceae	<i>Astragalus, Silene, Hypericum</i>	12,50	13,0	5,70
Yandağ (Isparta)[27]	729	13,80	Fabaceae, Asteraceae, Poaceae	<i>Salvia, Astragalus, Trigonella</i>	19,80	16,30	3,80
Akşehir (Konya)[28]	-	0,80	Asteraceae, Poaceae, Fabaceae	<i>Ranunculus, Juncus, Polygonum, Potamogeton</i>	11,20	25,60	8,80
Derebucak-İbradı-Akseki[29]	960	17,3	Asteraceae, Caryophyllaceae Liliaceae	<i>Sideritis, Astragalus, Silene</i>	-	-	-
All of Isparta vilayet [9]	2280	28,50	Asteraceae, Fabaceae, Poaceae	<i>Astragalus, Silene, Verbascum</i>	-	-	-



According to the information received from the people in the region, especially shepherds and forestry; the public believes that Dedegülçiceği (*Centaurea bornmuelleri* or a *Jurinea* sp.) will bring good luck, and they keep the flowers of its at home for a while. For many illnesses, its tea is brewed and drunk. It is short-lived, rhizomatous, perennial, light blue or whitish-flowering, and even pleasant-smelling. In the place where the tomb of Dedegül is located, it is a rare endemic growing on the rocky slopes between Karagöl and the peak. Tourists climb to the top of the mountain to see this species. Some of them can see, but some can not. Others think of other fragrant plants as degenerate flowers.

There is also Dedegülçayı (*Cyclotrichum origanifolium*) at the mountain. It is named "Kafaotu, Kafasüpürgesi or Karabaşotu" in Senirkent. It grows on damp bare rocks and at high altitudes. The Yaka villagers sells locals from the tops of the village and sells them in Pınarpazarı of Eğirdir. It is used against diabetes, infectious diseases; it is brewed and drunk for a delicious fragrant tea. It is a well known, popular and sold plant in the region. Agriculture can not be done. However, it can only be produced on fields in forest openings in high mountains.

Marsuvan otu / Herdemtaze / Altınotu (*Helichrysum plicatum*) is a very important economic value and must be cultured. It is also an important medical plant in the mountain. Its tea is drinking against the urinary tract disorders. The local people collect the upper parts of this plant, especially the flowering part in the growing season, dried in the shade, and used especially in the winter season. They are sold in bundles in transit.

This mountain is very important in local agriculture. It is known that the plant geography, ecological conditions and floristic structure of the mountain are important in the selection of the plant to be cultivated. Lakes Region is the center of roses and fruit production in Türkiye. More than 50 % of the fruit trees in Türkiye belong to the Rosaceae family. This success is due to the fact that the Dedegül mountain. It is a genetic center for the *Rosa* genus. Almost all of the fruit trees have a few wild forms in this mountain flora.

### 3.6. Some plants growing naturally on Dedegül Mountain and in high economic importance:

#### 3.6.1. Mushrooms:

There are edible mushroom taxa in the mountain. Kuzugöbeği (*Morchella* spp.), Çayır mantarı (*Agaricus campestris*), İstiridy mantarı, Çıntar (*Pleurotus ostreatus*), Domalan / Türüf mantarı (*Tuber* sp.), *Agaricus bisporus* and *Pleurotus ostreatus* have been produced in the region especially in Isparta and Burdur in recent years. The quality of produced *Morchella* species is poor as well as the production experiment. For this reason, there is a market problem. Only natural breeders can be sold as fresh 100-125 TL/kg, dried 800-1000 TL/kg. When the species are fresh, the water is used to treat eye diseases. Protein is high. It's the top quality mantle.

#### 3.6.2. Herbaceous plant taxa:

For medical and aromatic purposes: Dedegülçiceği (*Centaurea bornmuelleri* or *Jurinea* sp.), Altın otu / Marsuvanotu / Solmazçiçek (*Helichrysum plicatum* and other *Helichrysum* spp.), Rezene / Arapsaçı (*Foeniculum vulgare*), Kekik / Zahter (*Thymus*, *Thymbra*, *Corydanthus*, *Origanum*, *Satureja* spp.), Bayır çayı / İncir kekiği (*Origanum majorana*), Sütçüler Kekikiği / Aşkekiği / Tota Kekikiği / Yayla kekiği (*Origanum minutiflorum*), Acı yavşan / Pelin (*Artemisia absinthium*), Isırgan otu

(*Urtica dioica*, *U. urens*), Şalba / Bozot / Adaçayı (*Salvia tomentosa* and so on.), Oğlanotu (*Teucrium polium*), Yarpuz / Nane (*Mentha spicata*, *M. longifolia*), Adaçayı / Eşekotu / Dağçayı / Yaylaçayı (*Sideritis* spp.), Yılanburçağı (*Arum* spp.), Suteresi / Gerdeme (*Nasturtium officinale*), Karağan / Laden / Pamuklukotu (*Cistus* spp.), Salep (*Orchis*, *Ophrys*, *Cephalanthera* spp.), Kantaronotu / Binbirdelik otu (*Hypericum* spp.), Ayvadana / Civanperçemi (*Achillea* and some *Tanacetum* spp.), Papatya (*Anthemis*, *Tripleurospermum* spp.), Ebegömeçi (*Malva neglecta*, *M. sylvestris*), Yabani soğan (*Allium* spp.), Beyşehirçöğeni / Çevgen (*Gypsophila arrostii* var. *nebulosa*), Sümbül (*Muscari* spp.), Yakıotu (*Epilobium* spp.), Çiğdem (*Crocus* spp.), Gelincik (*Papaver*, *Glaucium* spp.), Sirken / Akpazı (*Chenopodium* spp.), Eşekmarulu (*Taraxacum* and *Sonchus* spp.), Güneğik / Karakavuk (*Cichorium intybus*), Topuzluk (*Echinops* spp.), Oğul otu (*Melissa officinalis*), Siğil otu (*Chrysophora tinctoria*), Böğürtlen, Börtlek (*Rubus* spp.), Sığirdili (*Anchusa* spp.), Deve dikenini (*Onopordum* spp.), Hardal (*Sinapis arvensis*), Sakız otu (*Chondrilla juncea*), Menekşe (*Viola* spp.), Yabani turp (*Raphanus sativus*), Demirdikeni / Deveçökerten (*Tribulus terrestris*), Bitirak (*Arctium tomentosum*), Ayrıkotu (*Cynodon dactylon*), Yaylaçayı / İnceçay / Dağçayı (*Sideritis libanotica*), Balotu / Emzikotu (*Onosma isauricum*), Gelincik (*Papaver rhoeas* etc.), Sinirotu / Sinirliot / Kırkdamarotu (*Plantago major* subsp. *intermedia*), Zambak (*Lilium* spp.) and Abdestbozan (*Sarcopoterium spinosum*) etc.

#### 3.6.3. Ornamental plants:

Şakayık / Ayıgülü (*Paeonia mascula*), Menekşe (*Viola* spp.), Dağ lalesi (*Anemone* spp.), Sarmaşık (*Hedera helix*), Dağkaranfili (*Dianthus* spp.), Keçibiciği (*Michauxia campanuloides*), Eğreltiotu (*Dryopteris filix-mas*), Kartaleğreltisi (*Polypodium vulgare*), Acı çiğdem / Kılıç otu (*Gladiolus italicus*), Süzen / Zambak (*Iris* spp.), Nergiz (*Stenbergia lutea*), Kardelen (*Galanthus* spp.), Ağlayangelin (*Fritillaria* spp.), Lale (*Tulipa* spp.), Damkoruğu / Sabirotu (*Sedum* spp.) and *Sempervivum* spp., Gölotu / Boynubükük (*Leucolum aestivum*), Kardelen (*Galanthus gracilis* and *G. elwesii*), Çuhaçiçeği / Dağmarulu (*Primula veris*, *P. vulgaris*), Topalak (*Cyclamen* spp.) and Süsen / Zambak (*Iris* spp.).

#### 3.6.4. Food plants:

İlabada / Kuzukulağı / Evelik / Efelek (*Rumex* spp.), Böğürtlen / Börtlek (*Rubus* spp.), Horozibiği (*Amaranthus retroflexus*), Isırgan (*Urtica dioica*), Tokmekan / Tokmakan / Semizotu (*Portulaca oleracea*), Acı çiğdem / Kılıçotu (*Gladiolus illyricus*), Çiğdem (*Crocus biflorus*, *C. chrysanthus*) Sığirdili (*Anchusa azurea*), Çobançantası (*Capsella bursa-pastoris*), Çakır dikenini (*Eryngium campestre*, *E. billardieri*), Ebegömeçi (*Malva neglecta*, *M. sylvestris*), Hardal (*Sinapis arvensis*), Yabani bakla (*Vicia sativa*), Gıvışganotu (*Silene vulgaris* var. *vulgaris*), Yemlik / Tekesakalı (*Tragopogon latifolius* var. *angustifolius*, *Scorzonera cana*), Madımak / Çobandegneği / Kuşekmeği (*Polygonum cognatum*, *P. aviculare*), Körmen (*Allium scorodoprasum* subsp. *rotundum*), Salep (*Orchis laxiflora*; *O. tridentata*), Dağ Eriği / Çakal eriği (*Prunus divaricata* subsp. *ursina*), Çördük / Turşu otu / Tarhana otu (*Echinophora* spp.), Çöven (*Gypsophila arrostii* var. *nebulosa*). Edible plants from aromatic and these plants can also be added to this group.

### 3.6.5. Woody taxa:

**Essential oil plants and aromatics:** Sumak / Mavru (*Rhus coriaria*), Ihlamur (*Tilia argentea*), Yağlıardıç / Kokarardıç (*Juniperus foetidissima*), Murt / Mersin (*Myrtus communis*), Kebere / Gebere (*Capparis spinosa* var. *spinosa*, *C. ovata*), Karaçalı / Çaltıdiken (*Paliurus spina-christi*), Defne / Tehni / Tehnel (*Laurus nobilis*), Karağan / Laden / Pamuklukotu (*Cistus* spp.), Tesbih çalısı / Ayıfındığı (*Styrax officinalis*), İledin / Köknar / Gökknar (*Abies cilicica* subsp. *isaurica*), Çam / Şam (*Pinus* spp.), Sedir / Katran ağacı (*Cedrus libani*), Kuşburnu / İtburnu (*Rosa dumalis* subsp. *boissieri* var. *antalyensis* and other *Rosa* spp.), Sığla/ Günlük (*Liquidambar orientalis*) and Çınar / Kavak (*Platanus orientalis*).

### 3.6.6. Wild fruits:

Kızılcık/ Ergen (*Cornus mas*), Elma (*Malus sylvestris*), Armut / Ahlat (*Pyrus* spp.), Kuşkirazı / Kiraz (*Prunus* spp.), Dağmuşmulası / Kürt (*Cotoneaster* spp.), Üvez (*Sorbus* spp.), Payam / Badem (*Amygdalus* spp.), Kuşburnu / İtburnu (*Rosa dumalis*, *R. canina*, *R. pulverulenta*, *R. horrida* etc.), Aliç / Kızılcık / Yemişen (*Crataegus* spp.), Kızılcık / Ergen (*Cornus mas*), Menengiç / Çıtırık (*Pistacia terebinthus*), Çakaleriği (*Prunus spinosa* subsp. *dasyphylla*), Geyikeması (*Eriolobus trilobatus*), Doğan ağacı / Çitlembik (*Celtis australis*).

### 3.6.7. Forest trees:

Karaçam (*Pinus nigra*), Katran / Sedir (*Cedrus libani*), Dikenardıç (*Juniperus oxycedrus*), Yağlı ardıç/ Kokarardıç (*Juniperus foetidissima*), Boylu ardıç / Bozardıç / Kara ardıç (*J. excelsa*), İledin/ Gökknar (*Abies cilicica* subsp. *isaurica*), Şimşir / Akçaağaç (*Acer* spp.), Dişbudak (*Fraxinus* spp.).

### 3.6.8. Plants for ornamental / landscaping purposes:

Papazkühlahı (*Eunymus latifolius*), Karaçalı / Çaltıdiken (*Paliurus spina-christi*), Şimşir / Akçaağaç (*Acer* spp.), Dişbudak (*Fraxinus* spp.) Karamuk / Kadıntuzluğu / Hanımtuzluğu (*Berberis vulgaris*, *B. crataegina*), Karaçam (*Pinus nigra*), Çınar / Kavak (*Platanus orientalis*), Pınal meşesi / Pıynar (*Quercus coccifera*), Kasnak meşesi (*Quercus vulcanica*), Söğüt (*Salix* spp.), Kavak (*Populus* spp.), Sandal / Kocaağaç (*Arbutus andrachne*), Erguvan / Gelinyemişi (*Cercis siliquastrum*), Dumanağacı (*Cotinus coggygria*) and Papaz külahı (*Eunymus latifolius*).

**3.6.9. Plants in horticulture / Agroforest: Fruits** (apple, cherry, apricot, strawberry, quince, new world, pearl, pear, hawthorn etc.), **wild deer, fruits, cutting roses** (in Antalya) and **oil rose production** (in Burdur, Isparta, Afyonkarahisar) are belonging to microclimatic effects produced by this mountain in the region. Strawberry (especially produced successfully in Şarkikaraağaç in recent years), the apple of Isparta (22 % of Türkiye's apple production from Isparta). Isparta is leader in the oil roses production of world. In recent times, lily production in Isparta has also been increased and turned into an industrial product.

*Iris germanica* (Zambak in Turkish) is produced in the vicinity of Keçiörü for this aromatic oil purpose. The productions of lavender (*Lavandula angustifolia*) and lavandin (*Lavandula x intermedia*) are around 350 da in the vicinity of Keçiörü. Isparta oil rose (*Rosa damascena*)

is produced in the region since the Ottoman time. In recent years, oil rose production has been reached 35000 da areas. *Papaver somniferum* (Haşhaş in Turkish) has also been produced for medicinal purposes since the Ottoman period. Its production is supervised.

Şekerfasülye, Akçabelen fasülyesi (sugar bean) which is a high quality and brand-name produced in the related area is a result of microclimate that flows the Akçabelen village neighborhood of Beyşehir and also Yakaavşar town of Aksu (Isparta). A lot of sugar bean (Şeker fasülye) varieties are produced in especially Iğın, Seydisehir, Yalvaç, Şarkikaraağaç, Yenişarbademli, Eğirdir, Aksu (especially Yakaavşar town) in the region. Sugar beans carry a geographical sign for the region. Not only sugar beans, but also many kinds of vegetables such as pea, chickpea, cowpea, red kidney beans are produced. This success is thought to be due to the fact that Leguminosae family is from large families in the mountain flora and that microclimate is effective. Protein value is around 18% in normal beans and about 30% in this bean. There is a project that is protected by the World Bank for the protection of this bean [31].

Honey production in the region is important as economic. There are varieties such as lavender honey, Yaylabalı (ie. plateau honey) and Karakovan honey. It is known that honey quality and production are related to floristic variety and vegetation. The rose honey, lavender honey, and pine honey can be produced in the future. The quality of the products in the region is high and therefore there is no problem in sales. Honey is also produced in lavender, rose, lily, thyme fields and fruit gardens and natural fields.

There are many kinds of medicinal and aromatic plants collected from the mountain. Significant revenues are gained from these crops both in Türkiye and abroad. Most of these plants are herbaceous and geophyt plants, which are commercial values and sold abroad from Türkiye [30].

Zindan Cave (in Aksu), Pınargözü Cave (in Yenişarbademli, 16 km in length) are the most attractive caves of Türkiye. Especially Karagöl (in 2350 m) is an interesting karstic formation. Rock type and karstic structure of the area have been very influential in the formation of caves and boulders. In here, the local people can store the foods (cheese, butter etc.) for a long time. This tradition is still maintained in some parts.

Dedegül mount is the richest area of the Lakes Region in terms of vegetation and animal diversity. It was selected as one of Türkiye's 122 Important Plant Areas. At the same time, it is one from Important Nature Fields [2 and 3].

The rock variety of Dedegül Mountain has been an important factor in the soil diversity of agricultural areas. It is known that after the climate, the soil factors are effective in the growth of plants, and soil in some plants it is the first factor. The diversity of volcanic rocks in the region has been influential in the formation of fertile agricultural lands.

The main rock in the area is limestone. Locally small blocks of serpentine are visible. It is known that the rock variety is effective in chemical composition of water. There are underground lakes in Dedegül mountain. The rivers that come out of the mountain go out with the increase of the water level there, decrease and increase. Because it is the highest mountain and big in the region. It receives the highest rainfall and these rains descend inferior in time. Dungeon cave such as Karagöl, Pınargözü is also nourished by the precipitation. Başpınar, Beyşehir Lake and Eğirdir Lake's water resources from the bottom of this mountain is the extensions of the mass of water to the earth. This wet

and damp structure have been influential in the formation of wetlands, meadows and marshes around the mountain. An important part of these mers are the shores of Beyşehir Lake and Yalvaç, Hüyükülü, Şarkikarağaç Göksöğüt, Çiçekpınar. It's around Senirkent Trotter. In these areas, pastures management was projected with the works of the Provincial Directorate of Food, Agriculture and Livestock [13] to improve the animal husbandry and to distribute the facilities equally to the people in the rural areas. Significant distances have been taken in these studies. This success is due to the fact that there is microclima and water source which is formed by the related mountain.

## CONCLUSION AND RECOMMENDATIONS

Since the area is located between Central Anatolia and the Mediterranean, the flora and vegetation must reflect the characteristics of the Mediterranean and Iran-Turan regions. Mediterranean forests, alpine steppe, stony slopes and steep rocky vegetation cover vast areas. In the lower parts, maquis communities, plains, steppes, red pine (*Pinus brutia*), river-coastal plant communities, agricultural areas; mixed forests of cedar / tar (*Cedrus libani*) and larch (*Pinus nigra* subsp. *pallasiana*), up to 2000 m in height. On the tree border (2000 m), it consists of mountain steppes, juniper (*Juniperus excelsa*), fragrant juniper (*J. foetidissima*) communities and steep rocky vegetation cover.

**Endemic plant taxa to the area** and its environment: approximately 40,

Plant taxa in the **VU** (at risk) category in the mountain: 20,

Plant taxa in the **CR** (Critical) category in the mountain: 1,

Plant taxa in the **EN** (Endangered) category in the mountain: 6,

Rare and endangered plant taxa in the area: 52,

Number of endangered species on a global scale 1 (*Acer hyrcanum* subsp. *sphaerocaryum*); Number of endangered species on European scale 49,

According to the **Bern Convention**, the number of endangered natural habitats is 5 (West Taurus *Abies cilicica* forests, *Pinus nigra* subsp. *pallasiana* forests, South Anatolian *Pinus brutia* forests, Taurus *Juniperus excelsa* forests, Taurus cedar (*Cedrus libani*) forests) [5 and 11].

Farming, animal husbandry and forestry are made in the mount. Foliage and vegetable cultivation are carried out in the covered districts. Apple, rose, strawberry is one of the important income sources of Isparta and the region. This success is due to the floristic structure of the Dedegül mountain and the effect of microclimate on the environment.

The area has been the scene of many civilizations throughout history. BC. Etiler (Hittites) in 4000 BC, Phrygians in 1500 BC Ions in 800 BC Lydians in 600 BC, Persians in 450 BC in 190, the Romans, AC. in 395 the Byzantines were dominant in the region. The dungeon of Aksu is one of these ancient cities [1].

After the Malazgirt Victory in 1071, Anatolia joined to the Seljuk lands in 1142. During the Seljuk period, Sultan Alaaddin Keykubat built the Kubat-Abad city and made the second capital, saying: "Heaven is here or under this place". This word is still valid for this day and indicates the uniqueness of the area [1].

Wild plants have been used as important food in

prehistoric communities. The transition to plant and animal breedings between the years 6000-7000 (Neolithic period) reduced the importance of wild plants, but during the famine period wild plants were used as food. In Anatolia, wild apples (*Malus sylvestris* subsp. *orientalis*), Hibiscus / Ebegümeçi (*Malva sylvestris*), Palamut meşesi (*Quercus ithaburensis* subsp. *macrolepis*) and many other plant foods were used as raw or cooked. The role of these civilizations is great in the cultivation of the region and in agricultural plants.

Today, around 3000 plants are cultivated for food purposes in the world. The number of natural plants used as food is more than 10.000 [32]. According to the 11th volume of Flora of Turkey, the number of plant species in our country is 11.014 and 3.708 is endemic [5c]. Dedegül Mountain is an important center for bulbous, medicinal and aromatic purposes as well as fruit trees.

Mount Dedegül is the highest mountain in the region. It is also linked to other mountains. Thus microclimate was formed in the region and ecosystems came to the foreground. Every ecosystem has its own plants and animals that feed and shelter those plants. In Lakes Region, most of the plants are grown naturally in this mountain. People around the area are more likely to benefit from the flora than other places. Thyme, sage, caravan etc. It is collected and sold for commercial purposes. Boynubükük / Gölsoğanı (*Leucojum aestivum*) only grows in an small area on the edge of this mountain and is protected by the Nature Conservation and National Park Directorate. In MAREM, located in Eğirdir, experiments on reproduction of this plant have been made. The symbol of the EXPO 2016 Fair held in 2016, Ayigülü / Şakayık (*Paeonia mascula*) grows best and best on this mountain. The people of the region depend on agriculture for the first time. Almost all of the plants produced in agriculture grow naturally in this mountain. Therefore, this seedling / breeding, rootstock etc. are obtained. In addition, the presence of the wilds of agricultural plants to be produced on a mountain is an indication of the success of the cultivation of that plant group in the relevant area. Irrigation and water features are very important in agriculture. In both drinking water and agricultural irrigation, the water reserve of the mountain concerned is quite significant and important. It is known that the freshwater resources are decreasing in our country and its importance increasing.

The sources of the floristic richness in the area is due to its mikroklima, soil and rock properties. The fact that our study area is mainly influenced by the Mediterranean phytogeographical region, although the endemics of Türkiye are mostly in the range of 1000-2000 m. The fact that most of the cultivation is carried out at these heights is the most important factor in the low rate of endemism. The excessive number of taxa may be another factor that reduces the endemism rate.

Although the Long Period Development Plan (UDGP) of the Beyşehir Lake National Park exists, the plan is not implemented. Our idea is that; the private company that prepared the plan probably drafted the plan depending on the literature to reduce the cost and the experts in the field did not review it. Therefore, the plan has no provisions.

**4.1. Hazard Categories and Protection Status:** Only a small part of Dedegül Mountain is protected because it is included in the scope of Beyşehir Lake National Park. There is no protection status for the other part. Despite the fact that the area is very important, there is no its protection status. For this reason, the destruction has been made clear in recent



years. Marble and mines are opened by taking advantage of legal space and wildlife is damaged. The change of topography and microclimate due to vegetation is a threat to agricultural production, underground and super fresh waters and biodiversity on the ground. It is suggested that state and national care should be taken to protect all natural structures, especially topographic changes, up to the taking of the area protection status.

Local people living in or around protected areas such as National Park, Nature Conservation Area opposed to protected areas by complaints from their restrictions on their movement. While maintaining biodiversity in the local population, it is widely believed that the human needs of the people are not considered enough. However, biodiversity is health, education, economy. The only way to overcome this misconception and protect biodiversity is again education, project, skilled human power.

#### 4.2. The area is the target of biotools.

Every year, there are aliens who smuggle in this area. Local guides should be given to foreign tourists and the aims of the tourists should be well established. Especially in ecotourism, the danger of biofuels is higher. Consciousness of the local people is important.

Excessive grazing and cutting trees are other important threats. But the above threats are of higher priority. The cut is usually carried out by the General Directorate of Forestry. It is very damaging to the area. The removal of the historic larch forests in this way causes a new structure in the ecological structure. It changes the flora and vegetation of it. It is estimated that the number given in Table 1 is increased by at least 50 species and 20 endemic taxa in the mount. Plant diversity also encouraged the diversity of the field animals. Especially the apollo butterfly (*Parnassius apollo*) is an indication and endemic of the area. The diversity and populations of butterflies increase in the area where a lot of rose hip crops [33].

#### The effects on the local agriculture of Dedegül Mountain can be summarized as follows:

There are many medical and aromatic plants growing in the mountain. These plants are collected from nature or produced and contribute to the economy and health of the local people. The most important of these is undoubtedly the poppy.

Fruit farming is leading in local agriculture. Especially strawberry, apple, quince, rose, rosehip, cherry, plum, pear etc. They grow as wild plants in the mountains. In the same way (grape), fig (nut) also naturally grows in the relevant area. This situation indicates that such fruit plants are the natural spreading area and ecologically the most suitable growing area in the region.

There are many wetlands around the mountain. The importance of wetlands is increasingly understood. Some of these areas are considered as meadow-pasture. This situation is also an important contribution to local animal husbandry.

Source streams such as Aksu, Başpınar and Pınargözü are important services in both drinking water, agricultural irrigation and fishing. Fish farms in Aksu are fed from this source.

The knowledge and experience inherited by the ancient civilizations in the region are also important in the food and agriculture. When all the features are combined, the Seljuk Sultan reminds the words of Alaaddin Keykubat: "Heaven is here, or underneath". Protecting the area is very important for this reason.

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