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New Collections and Observations on *Gypsophila* L. taxa in Türkiye

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Abstract
This study is carried out between 1994-2023 years in Türkiye. The *Gypsophila* is a problematic and important genus that needs revision but will take several years. In the article, geographical distributions, endemism, flowering and fruiting months, habitat preffering, phytogeography and IUCN danger category of *Gypsophila* taxa distributed in Türkiye are explained according to field observations and herbaria records. Belonging to 51 taxa (47 species), almost 980 collections from 400 localities were identified. Other 15 species not carried out by us. The results presented here are based on informations of *Gypsophila* taxa in the country. In the light of current information, there are a total of 65 taxa belonging to 62 species in the country and these taxa named in actual situation. 39 taxa of these plants are endemics to Türkiye. Almost 40 taxa from 62 species in Türkiye shows natural distribution in Eastern Anatolia region. This situation shows that; 2/3 of *Gypsophila* taxa is in Eastern Anatolia region and endemic. Irano-Turanian element ratio in the genus is higher than this value. Species of the genus are distributed according to rock, climatic and geographical region. 9 taxa are indicators of gypsum areas. Among the plants in the paper Irano-Turanian elements 36, Saharo-Arabian element 1, Mediterranean elements 7, Euro-Siberian elements 4, Euxine elements 2; Cosmopolitan 1. Endemism; relict endemic 1, local and regional endemics 11, other endemics 20, nonendemics 19 as rare 1 taxon. Distributions to pytogeographical regions of endemic taxa as follows; endemic Irano-Turanian elements 23, endemic Mediterranean elements 6 and endemic Euro-Siberian elements 2. Weeds growing in fields are 4 taxa. There are new interesting geographical distributions for almost 20 taxa. Distributions to life forms of the taxa are Ch: 33, T: 14 and Chz: 4 taxa. Distributions to IUCN Threatened Cathegories of the taxa are Lc: 19, CR: 10, VU: 9, cd: 8, EN: 4, NT: 1. These two factors are dominant in the high level of endemism. 10 taxa in 0-500 m, 21 taxa in 500-1000 m, 26 taxa in 1000-1500 m, 24 taxa in 1500-2000 m, 17 taxa in 2000-2500 m, 7 taxa in 200-3000 m, 1 taxon in 3000-3500 m are naturally growing and vertical distribution. 40 taxa on steppe vegetation and slopes, 18

taxa on rocky (calcer, volcanic and conglomerate rockies) and their crevices, 14 taxa on gibsous rocky places, 10 taxa alpinic pastures /meadows, 4 taxa on macquis vegetation, 4 taxa on sandy soils, 6 taxa on forest (pine and oak) and opens, 16 taxa on fallow fields and margins and roadsides, 5 taxa on saline soils and 5 taxa on stream bads are naturally growing in Türkiye. Flowering months: 2 taxa in April, 17 taxa in May, 38 taxa in June, 40 taxa in July, 23 taxa in August, 1 taxon in September. Fruiting monts: 1 taxon in May, 12 taxa in June, 46 taxa in July, 42 taxa in August, 13 taxa in September, 2 taxa in November. The gene center of this genus has been estimated as the Eastern Anatolian region (Türkiye) in Irano-Turanian phytogeographical region. Five diversity areas in Türkiye identified: Lakes region, Mountaining areas in East Anatolia region, Region of Sivas, Erzincan Malatya, Tunceli, Erzurum, Bayburt, Gümüşhane, Region of Niğde, Aksaray, Ankara, Çankırı, Konya, Çorum, Yozgat, Region of Eskişehir, Kütahya and Bursa are very important areas in diversity for the genus. Existences of *G. linearifolia* in the country have not become definite. It was seen samples of *G. muralis, G. antari,* and *G. laricina* in fields in the country.

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INTRODUCTION

Genus *Gypsophila* is closely related to *Ankyropetalum* Fenzl and *Bolanthus* (Ser.) Rchb. genera. All taxa of genus *Bolanthus* in Türkiye are endemics. There are 3 species of *Ankyropetalum* in Türkiye. Two of them are endemic to the country. Although the other one (i.e. *A. gypsophiloides*) is not endemic, but rare for Türkiye. It spreads in countries close to Southeast Anatolia region. Gene centers of the three genera are in Türkiye. All of them, are Iran-Turan region origins.

East Anatolian region in Türkiye has not been fully investigated from floristically. The importance of the region is well known to professional botanists especially taxonomists, but this information is virtually inaccessible to general investigators or layman in distant place. Floristic investigations in the region by local botanists have greatly increased during the last 70 years. Researches have found out that the occurrence of endemics and rare plants in the region is exceptionally high for some groups as compared to other regions.

These studies largely described situation of the breed in Türkiye. Most of these studies have been done by us. The works still continue. Some of the studies have been published and some have not.

This article also belongs to this unpublished part. Other than that, they have done considerable researches on the ecological and economic importances (Korkmaz et all., 2008; Karagüzel and Altan, 1999; Farnham et all., 1978; Çevrimli et all., 2007) and other scientific characters (Arslan and Güleryüz, 2002; Barrera and Arenas, 1999; Özdemir et all., 2010; Korkmaz and Özçelik, 2012; İpek and Gürbüz, 2012).

IUCN risk categories of Turkish plants Ekim et al. (2000), geographical distribution, Turkish names, economic importance and risk categories of taxa in Türkiye belonging to the genus *Gypsophila* have been published previously (İpek and Gürbüz, 2012). Except new taxa, new square records and new materials collected for floristic studies in various regions, no detailed systematical study on *Gypsophila*. It is one of the most difficult genera of Turkish flora since the publication of 'Flora of Turkey….'.

The aim of this paper is to put orth information on genus *Gypsophila,* obtained by us during area studies in different regions by fillt in the gaps and elucidate the problems in the taxonomy of *Gypsophila* in Türkiye. We hope to be useful to those who are interested in plant geography and systematics.

MATERIAL AND METHODS

Voucher herbarium materials belonging to genus *Gypsophila* were collected from all Türkiye, especially Lakes Region, Inner and Eastern Anatolia regions. Almost 980 collections from 400 localities were identified by using the second and supplemental volumes of 'Flora of Turkey…' (Davis, 1967; Davis et all., 1988; Güner et al., 2000).

Habitat, altitude, frequency, abundance, species diversity and intra-species variations where plants grow on the land were carefully observed during the collection from the areas. Samples were collected for the herbarium from plants that were considered important and were made into herbarium material according to the rule. The areas that breed most species were determined as the center of differentiation of genus *Gypsophila,* while areas with most intra-species variation were determined as the center of differentiation of species. Investigated *Gypsophila* samples identified and named by (Davis, 1967; Hub.-Mor. et. al., 1967; Barkoudah et al., 1964; Güner et al., 2000; Güner, 2012). 15 species as *G. baytopiorum, G. brachypetala, G. festucifolia*, *G. glandulosa, G. hakkiarica, G. hispida, G. linearifolia, G. nabelekii*, *G. nodiflora, G. oblanceeolata, G. patrinii, G. peshmenii*, G. *polyclada, G. serpylloides* and *G. turcica* showing distribution in Türkiye are not investigated and not place in the paper.

Abbreviations in the text: Mt/mt: Mountain, el: Element, Euro-Sib.: Euro-Siberian, E.: East, Medit.: Mediterranean, Ir.-Tur.: Irano-Turanian region, VANF: Van Yüzüncü Yil Univ. Science and Arts Herbarium (in Van), GUL: Herbarium of Süleyman Demirel Univ. (in Isparta), Hb.: Herbarium/Herbaria; ±, ca: more or less; f., fil.: son; N: north, S: south; E: east, W.: west; prov.: Province (Vilayet in Turkish), Sect.: section, G.: genus *Gypsophila;* Fig.: Figure, Fl.: Flowering, Fr.: Fruiting time (as month), n.: number, J.: Journal.

IUCN Red Data Book Cathegories: VU: Vulnerable, LR: Lower Risc, LC: Least concern, NT: Not currently endangered, but may be endangered in near future, EN: Endangered, CR: Critically endangered, Lc: Least concern and Cd: Conservation dependent in LR (Lower risk).
Life Forms: Ph: Phanerophyte, Ch.: Chamaphyte, HC. Hemicriptophyte, T: Therophyte, Geophyte, Chz.: Chasmophyte:

Abbreviations of the researchers whose samples were examined are as follows: Özçelik: Hasan Özçelik (first author), Özgökçe: Fevzi Özgökçe (second author), M.Ç.: Metin Çetinkaya, M.K.: Mustafa Korkmaz, Ş. Öztürk: Şükrü Öztürk, A. Özçelik: Adnan Özçelik, İ.U.: İsmet Uysal, Tatlı: Âdem Tatlı, Çetik: A.Rıza Çetik, Varol: Ömer Varol, A.Ç.: Ali Çelik, Muca: Belkıs Muca Yiğit, M. İnan: Mehmet İnan, İlçim: Ahmet İlçim, Kandemir: Ali Kandemir, Varol: Ömer Varol, H.M. Şan: Halil Murat Şan, Berber: İsmet Berber.

Correct spelling of taxa names in the light of the relevant literature; hazard situations and geographical distribution, risc category according to IUCN are written based on our observations.

FINDINGS AND DISCUSSION

The results presented here are based on information from about 980 samples belonging to 48 taxa of 400 lacalities from 58 species of *Gypsophila* in the country. 32 taxa of these plants are endemics to Türkiye. 43 taxa from 58 species in Türkiye shows natural distribution in Eastern Anatolia region. This situation shows that; 2/3 of *Gypsophila* taxa is in Eastern Anatolia region and endemic. Irano-Turanian element ratio in the genus is higher than this value.

Area studies: Diversity centers and habitats of the genus *Gypsophila* L. in Türkiye:

Mountaining areas in East Anatolia region: Especially in Ağrı, Van and Bitlis provinces (Van Lake Basin) can be accepted as great diversity center of the genus. Hakkari, Kars, Iğdır and Ardahan can also be included to this center.

Başkale and especially Van Lake Basin are important differentiation centers. *G. graminifolia, G. bitlisensis, G. bicolor, G. brachypetala, G. paniculata, G. dumanii* and *G. nabelekii* differentiated in there. This region has not been sufficiently studied from a floristic point of view.

***Region of Sivas, Erzincan Malatya, Tunceli, Erzurum, Bayburt, Gümüşhane*:** In this region, Keşiş dağı, Kop dağı, Darende, Gürün, Kangal towns, Böğrüdelik and Horoz passes are very important. *Gypsophila venusta* subsp. *staminea, G. adenophylla*, *G. leucochlaena, G. tuberculosa*, *G. aucheri, G. lepidioides* and *G. heteropoda, G. laricina, G. munzurensis, G. turcica* and *G. torulensis* were differentiated in the region.
These two areas can also be considered as a center. They are neighbors and are located in the Iran-Turan region. 38 of species of *Gypsophila* are endemics to Türkiye. 45 from almost 70 taxa in Türkiye shows the natural distribution in Eastern Anatolia region. This situation shows that; 2/3 of *Gypsophila* taxa in Türkiye is endemic and Eastern Anatolia region. Irano-Turanian element ratio in the genus is higher than 2/3 value. In addition, most taxa of the genus are grown in the steppe, and these habitats are mostly concentrated in the Irano-Turanian region, namely the East Anatolian region and Iranian sides. In this situation, gene center of this genus has been estimated as the Eastern Anatolian region.

Region of Niğde, Aksaray, Ankara, Çankırı, Konya, Çorum, Yozgat: *G. simonii, G. viscosa, G. germanicopolitana, G. leucocleana, G. perfoliata, G. oblanceolata, G. libanotica, G. elegans* and *G. parva* differentiated in there. *G. germanicopolitana, G. simonii* and *G. oblanceolata* prefer stony, loamy, sandy, salty marshy edge and gypseous areas. Such habitats are also found a lot in the relevant region. *Gypsophila* grows in abundance in and around Ereğli, Kardeşgedigi pass (1300-1500 m). Populations are declining after this region. Above-ground stems grow parallel to surface for a while, then rise and form clusters.

Region of Eskişehir, Kütahya and Bursa: Uludağ and Sündiken mountains are very important differentiation centers. *G. osmangaziensis, G. olympica, G. sphaerocephala, G. pinifolia* etc. differentied in there.

Lakes region (Region from Isparta, Burdur, Antalya, Konya, Denizli and Afyonkarahisar): *G. arrostii* var. *nebulosa*, *G. serpylloides*, *G. pilulifera, G. curvifolia, G. venusta* subsp. *venusta, G. confertifolia, G. pilosa* etc. differentied in there.

Investigated collections and field observations on taxa of *Gypsophila*:

Gypsophila adenophylla Barkoudah:
Van: Gevaş, E. slopes of Alacabük Dağı, upper parts of Balaban, rocky areas, cliffs, 05.vii.2020, 2540 m, Özgökçe 15303 (VANF 16268**!**).
Economic importance: Unknown.
Fl.: 7-8, **Fr.:** 7-9.
Habitat: Volcanic rocky places and its crevices on alpinic steppe, 2500-3000 (-3400) m.
Geographical Distribution: Endemic for Van Lake Basin. Irano-Turanian element.
Life Form: Ch.
IUCN Risc category: Lc.

Gypsophila guvengorkii Armağan, Özgökçe & Çelik:
Karabük: Keltepe, rocky crevices, 1981 m, 11.v.2012, Özgökçe & Çelik 585 (Isotype: in VANF, No: 162325**!**). (Armağan et al., 2017).
Economic importance: Unknown.
Fl.: 5, **Fr.:** 5-6.
Habitat: Rocky crevices, alpinic steppe.
Geographical Distribution: Endemic. Euro-Sibrian element.
Life Form: Chz.
IUCN Risc category: VU.

Gypsophila briquetiana Schischk.:
Tunceli: Ovacık, Munzur dağları, Karagöl valley, Cendere locality, rocky places, 39°23’363’’E, 39°07’039’’N, 1841 m, 29.vii.2011, Özgökçe 13841(in VANF**!**). **Van:** Bahçesaray, Serkani upper parts, rocky places, 2400 m, 27.vii.2001, Özgökçe 9938 (in VANF**!**). **Bitlis:** Tatvan, Alacabük dağı, N slopes of the mount, Balandız backs, steppe, 27.vii.2001, 2600 m, Özgökçe 9948 (in VANF**!**). Pelli (Alacabük) Mounth, east of Dağdibi village, 27.vii.2002, cliffs, Özgökçe 9938 (VANF 16266**!**). Ovacık, Munzur dağları, Karagöl valley, 1850 m, 29.vii.2011, Armağan and Özgökçe (VANF 162313!). **Erzincan:** Üzümlü, Keşiş dağı, around of Devrant, rocky crevices, 2517 m, 16.viii.2009,

Armağan and Özgökçe (VANF 162312!). Özçelik & A.Ç. 26, 27 (GUL 13/24/3-1,2!). Its distribution from Van and Bitlis provinces is slow, its distribution area has been expanded.
Economic importance: Unknown.
Fl.: 7-8, **Fr.:** 7-8.
Habitat: Rocky placess, cliffs, and crevices, steppe, 1700-2500 m.
Geographical Distribution: Endemic for Eastern Anatolia region. Irano-Turanian element.
Life Form: Ch.
IUCN Risc category: Lc.

Gypsophila davisii Barkoudah:
Muğla: Köyceğiz, the surrounding of Gökçeova Lake pastures, 1774 m, 10.vii.2009, A.Ç. G23 (VANF 162322!). It grows only in Muğla, Sandras dağı, alpinic pastures at almost 1700 m altitude (Armağan and Özgökçe, 2018).
Economic importance: Unknown.
Fl.: 7, **Fr.:** 7-8.
Habitat: Alpinic pastures, almost 1600-1800 m.
Geographical Distribution: It is a relict endemic. Mediterranean element.
Life Form: Ch.
IUCN Risc category: EN.

Gypsophila graminifolia Barkoudah:
This species is endemic and has only been recorded from Van: Başkale, Ispiriz dağı. There are samples belonging to two different populations collected by us from the same area.
1. population: **Erzurum:** Erzurum-Ispir highway, 8 km to Ispir, near Çoruh river, 1350 m, 3 vii 1975, Tatlı 1909 (Leg. R. Çetik & A. Tatlı) (GUL 13/24/5-1!). Altitude: From sea level to 1350-2700 m.
2. population: **Van:** Erek Dağı, rocky crevices, 2100 m, 07. vii 1994, Özgökçe 308 (GUL 13/24/5-2!). Stems 2-3 mm wide; leaves stuck at the base, linear, 50 x 2-3 mm; nodules distinctly yellowish white.
3. population: **Van:** 5 km to Başkale, rocky crevices, 2200 m, 25.v.1996, Özgökçe 380 (GUL 13/24/5-3!).
Economic importance: Unknown.
Fl.: 5-7, **Fr.:** 7-8.
Habitat: Rocky places and crevices, alpinic steppe, 1350-2200 (-2700) m.
Geographical Distribution: Clearly endemic for Van Lake Basin. Irano-Turanian element. A very distinct species.
Life Form: Chz.
IUCN Risc category: CR.

Gypsophila brachypetala Trautv.:
Özçelik & A.Ç. 23 (GUL 13/24/6-1!):
Economic importance: Unknown.
Fl.: 7-8, **Fr.:** 8.
Habitat: Limestone and crevices, alpinic steppe, 1800-2000 m.
Geographical Distribution: Endemic, Irano-Turanian element. It is a narrowly distributed endemic species registered from Kars for the type gathering and Zonguldak in the Black Sea region.
Life Form: Chz.
IUCN Risc category: VU.

Gypsophila tenuifolia M.Bieb.:
Ardahan: Göle, Allahuekber Dağları, W of Toptaş village, Çoraktepe locality, steppe, 2400 m, 18.vii.1982, A. Tatlı 6739 (13/24/7-1!):
Economic importance: Unknown.
Fl.: 7, **Fr.:** 7-8.
Habitat: Rocky places, alpinic meadows, 1600-2400 (-2700) m.
Geographical Distribution: Nonendemic. Caucasia and Türkiye. Rare for Türkiye. Euxine element.
Life Form: Ch.
IUCN Risc category: VU.

Gypsophila glomerata Pall. ex Adams:
Edirne: Türkiye-Greece border, Lalapaşa-İstanbul highway, Lalapaşa town exit, scrub, 100 m, 14.viii.2009, MK. 1971 (GUL 13/24/…01); Süloğlu, M.K.1978 (GUL 13/24/…02).
Economic importance: Unknown. It may be used as arrangement in ready flower.
Fl. 6-7. **Fr.** 7-8.
Habitat: It is growing on calcareous rocks, dry stony hills, rarely on sandy soil, 100 m.
Geographical Distribution: Nonendemic; Türkiye, Crimea, Caucasus, W. Transcaucasia: S. Ukraine, Bulgaria, Romania and Türkiye (Barkoudah, 1962; Anonymous, 2023b). Euro-Siberian element.
Life Form: Ch.
IUCN Risc category: VU.

Gypsophila syriaca Schischk:
A.Ç. 35 (GUL 13/24/8(3)-1!); A.Ç. 78 (GUL 13/24/8(2)-2!); A.Ç. 85 (GUL 13/24/8(2)-3!).
Economic importance: Unknown. It may be used as arrangement in ready flower.
Fl.: 8, **Fr.:** 9.
Habitat: On calcareous rocks, 1500-2000 (-2500) m. Amanos Dağları in the Mediterranean region is main habitat of this species.
Geographical Distribution: Endemic for South of Türkiye. Mediterranean element. The species is endemic and is known from Düldül Mountain (Adana).
Life Form: Ch.
IUCN Risc category: Cd.

Gypsophila sphaerocephala Fenzl ex Tchihat.:
Erzincan: Refahiye, Sakaltutan pass, steppe, 2170 m, 8.vii.2006, Özçelik 12439 (GUL 13/24/8-23!). **Malatya:** Darende, 38 km to Malatya, steppe with volcanic rocky, 1400-1550 m, 6.viii.2010, Özçelik 13227 (GUL 13/24/8(1)-19!); Özçelik 13228 (GUL 13/24/8/1-20!). **Kayseri:** Pınarbaşı, steppe, 1700 m, 6.vii.2010, Özçelik 13245 (GUL /24/8-5!); 32 km to Pınarbaşı, Özçelik 13244 (GUL 13/24/8(1)-21!); Between Yahyalı-Maden, rocky places, MK. 1896!; M.K. 1863 (GUL 13/24/8-5!); M.K. 1862 (GUL 13/24/8-6!); A.Ç. 53 (GUL 13/24/8-1!); A.Ç. 61 (GUL 13/24/8-1-18!); A.Ç. 58 (GUL13/24/8(1)-17!); A.Ç. 56 (GUL 13/24/8(1)-18!); A.Ç. 64 (GUL 13/24/8(2)-68!). **Sivas:** Gürün highway, alpinic steppe, limestone places, 1850-2000 m, Özçelik 13206 (GUL 13/24/8/1-6!); M.K. 1684 (GUL 13/24/8-7!). Sivas-İmranlı highway, 30 km to Sivas, steppe, volcanic rocky areas, 1300-1350 m, 22.vii.2010, Özçelik 13200 (GUL 13/24/8/1/-55!). **Van:** Özalp, Ahtadağ, steppe, 2487 m, 25.v.1996, Özgökçe 423 (GUL 13/24/8-2!); Özalp, N of Damlacık village, steppe, 2300 m, 14.vi.1996, Özgökçe 570 (GUL 13/24/8-3!); Damlacık village, Karavelitepe, steppe, 2423 m, 14.vi.1996, Özgökçe 584 (GUL 13/24/8-4!); Özgökçe 578 (GUL 13/24/8(2)-7!); Özgökçe 583 (GUL 13/24/08/8-09); Özalp, E of Beyaztaş hill, steppe, 2050 m, 30.v.1996, Özgökçe 697 (GUL 13/24/ 8(1)-42!). **Isparta:** Eğirdir, Barla Dağı, Pinus nigra forest and its opens, 1750-2000 m, 2.ix.1996, Özçelik 7654 (GUL 13/24/8-8!); Atabey: Kısıkboğazı, moist places, steppe, 25.vii.2014, Özçelik 15239 (GUL 13/24/8/-22!). **Bursa:** Uludağ, 2104 m, Özçelik (GUL 13824/8-24!).
Economic importance: Unknown. It may be used as arrangement in ready flower. It was used to rehabilitate degraded lands in Konya and was successful.
Fl.: 6-8, **Fr.:** 7-9.
Habitat: Gypsum areas, on calcareous rocks, limestone and volcanic rocky steppes, Pinus nigra forest and its opens, rarely moist places, 1500-2500 m. An indicator for gypsum areas.
Geographical Distribution: Nonendemic. Eastern Anatolia and Lakes Region in Türkiye and Iraq. Irano- Turanian element.
Life Form: Ch.
IUCN Risc category: Lc. Fig. 1.

Figure 1: ***Gypsophila sphaerocephala*** **in own habitats.**

Gypsophila laricina Schreb.:
Kayseri: Between Yahyalı-Maden, M.K. 1967 (GUL 13/24/…!); 32 km to Pınarbaşı, Mazıkıran pass around, moist steppe, 1700 m, 6.viii.2010, Özçelik 13237 (GUL 13/24/8-3!); Gürün-Pınarbaşı highway, 70 km to Pınarbaşı, calcerous areas, 1700-1800 m, 6.viii.2010, Özçelik 13238 (Özçelik 13/24/8(2)-32). **Sivas:** Kayseri highway, 100 km to Kayseri, moist places, 1600 m, July 2006, Özçelik 12218 (GUL 13/24/8 (2/-34!); East of Yeniçubuk, steppe, 1200-1400 m, 09.vii.2009, İlçim 1803 (VANF 163750!); East of Yeniçubuk, steppe, 1200-1400 m, 09.vii.2009, İlçim 1803 (VANF 163749!). **Erzincan:** Ergan Dağı, steppe, 1600 m, 11.vii.2011, MK. 2787 (GUL 13/24/8(2/72-73?!); Ergan Dağı, Binkoç village, steppe, 1500 m, 31.vii.2011, MK 2791?!); Keşiş dağı, steppe, 2400 m, 17.vii.2010, Özçelik 13146 (GUL 13/24(8(2)-26!); Keşiş dağı, steppe, 1700-1900 m, 14.vii.2010, Özçelik 13148 (GUL 13/24/8(2)-27!). **Siirt:** Pervari, down parts, steppe, 2145 m, 29.vii.2011, Özgökçe 13837 (in VANF!). **Tunceli:** Pülümür Erzincan and Erzurum crossroad around, steppe, 1600 m, 8.vii.2006, Özçelik 12451(GUL 13/24/8-3!). **Van**: Özalp, Kalecik village, steppe, 2180 m, 25.v.1996, Özgökçe 185, 195 (GUL 13/24/8(2)-8!); Özalp, Kalecik village, Sivri Tepe, steppe, 2180 m, 25.v.1996, Özgökçe 410 (GUL 13/24/8(2)-10!); Özalp, N of Damlacık village, steppe, 2300 m, 14.vi.1996, Özgökçe 583 (GUL 13/24/08/9-11!); Özalp, E of Beyaztaş Tepe, steppe, 2050 m, 30.v.1996, Özgökçe 696 (GUL 13/2478(2) 33!); Özalp, Sarıköy, W of Tuzlu Tepe, steppe, 2096 m, 02.viii.1996, Özgökçe 671 (GUL 13/24/8(2)-74!); Özçelik, A.Ç. & M. Korkmaztürk 33 (GUL 13/24/8(2)-25!); Özçelik, Muca G. 692(GUL 13/24/8(2)-44!); MK. 1893 (GUL 13/24/8(2)-1!); MK. 2636, 2009 (GUL 13/24/8-2!); M.K. 2104 (GUL 13/24/8(2)-11!); MK.1896 (GUL 13/24/8-12!); MK. 1894(GUL 13/24(8(2)-29!); M.K. 1889 (GUL 13/24/8(2)-30!); M.K. 1662 (GUL 13/24/8(2)-31!); M.K. 2787 (GUL 13/24/8(2/72-73!); A.Ç. 64(GUL 13/24/8(2)-68), A.Ç. 86 (GUL 13/24/8(2)-11!); İlçim 1803 (VANF 163749!, 163750!); Kandemir 5591 (Erzincan Univ. Hb.!).
Economic importance: Unknown. It may be used as arrangement in ready flower. It may be used to rehabilitate degraded lands.
Fl.: 5-7**, Fr.:** 7-8.
Habitat: Gypsum areas, moist places in steppe, calcerous areas, (1200-)1500-1900 (-2400) m. An indicator of gypsum areas.
Geographical Distribution: Nonendemic. Rare for Türkiye. Irano-Turanian element. The native range of it is Central and Eastern Anatolia regions of Türkiye and NW. Iran.
Life Form: Ch.
IUCN Risc category: Lc.

Gypsophila pilulifera Boiss. & Heldr.:
Kırşehir: Gülşehir, Hacıbektaş, Gülşehir exit (3845601N, 3437018E), steppe, 914 m, 8.viii.2007, A. Özçelik (GUL 13/24/9-2). **Isparta:** Davras dağı, steppe, 1750 m, June 1997, H.M. Şan 1001; 1002; 1003 (GUL 13724/9-3!). **Bilecik:** Between Bozöyük-Kütahya prov., near İnönü district, M.K. 2104 (GUL 13/24/8/2-11!). **Antalya:** Lara, near to the Delphin hotel, maquis opens, 40 m, 10.vii.2006, A. Özçelik ÇG.18(GUL 13/24/9-7).
2011, Muca: 15 (GUL 13/24/9-08; 02.vi.2009 (Leg.: Özçelik, Çelik & Muca), A.Ç: 01 (GUL 13/24/9-09): The general appearance of it is similar to *G. sphaerocephala* and *G. leucochleana.*
Economic importance: Unknown. It may be used as arrangement in ready flower and to rehabilitate degraded lands.
Fl.: 6-7, **Fr.** 7-8.
Habitat: Maquis opens and redpine forest, steppe, from sea level to 1700 m.
Geographical Distribution: Endemic. Meditrranean element. Distribution in Bilecik prov. is a very interesting.
Life Form: Ch.
IUCN Risc category: CR.

Gypsophila olympica Boiss.:
Bursa: Uludağ, alpinic steppe, calcerous areas, 1900-2100 m, June 2014, Özçelik 15552 (GUL 13/24/10-3!); A.Ç.: 77 (GUL 13/24/10-1!); Özçelik, A.Ç. & Korkmaztürk 36 (GUL 13/24/10-2!); General appearance of it is similar to *G. syriaca*.
Economic importance: Unknown. It may be used as arrangement in ready flower.
Fl.: 6, **Fr.**: 7.
Habitat: Alpinic steppe, calcerous areas, 1900-2100 m.
Life Form: Chz.

Geographical Distribution: It is clearly endemic for Uludağ (Bursa). Euro-Siberian element.
IUCN Risc category: EN.

Gypsophila osmangaziensis E. Ataşlar & A. Ocak:
Eskişehir: Osmangazi Univ., campus, M.K. 1967 (GUL 13/24/…!); M.K. 1967 (GUL 13/24/…!); Özçelik & Muca 48 (GUL 13/24/… 03!); M.K. 1979 (GUL 13/24/…!). **Kütahya:** Frgian valley (observed in the area). The distribution is a new record.
Economic importance: Unknown. It may be used as arrangement in ready flower.
Fl.: 6, **Fr.:** 6-7.
Habitat: Heaths and clearings, 800-1100 m. An indicator of gypsum areas.
Geographical Distribution: Endemic. Irano-Turanian element?
Life Form: Ch.
IUCN Risc category: CR?

Gypsophila pinifolia Boiss. & Hausskn.:
Malatya: 45 km from Malatya to Darende, steppe, 1343 m, 8.x.2012, Özgökçe 432 (GUL 13/24/11-1!). **Erzincan:** S of Erzincan centrum, near Sütpınar (Ekrek) village, N slopes, 1650 m, 7.vii.1987, Tatlı 8536 (GUL 13/24/11-2!). **Konya:** Ulukışla road, 30 km from Karapınar, steppe, 1350 m, 24.vii.1999, Özçelik 7967-b (GUL 13/24/11-3!); A. Özçelik ÇGG. 107 (13/24/11-4!); Varol 3079 (in Muğla Univ. Science Fac. Hb.!). **Van:** Özalp, Ahtadağ, E of little bear hill, steppe, 2487 m, 25.v.1996, Özgökçe 432 (GUL 13/24/11-1!).
Economic importance: Unknown. It may be used as arrangement in ready flower.
Fl.: 5-7, **Fr:** 6-7.
Habitat: Steppe, rocky slopes, 1000-1400 m.
Geographical Distribution: Endemic, Irano-Turanian element. It was known only from Malatya prov. Distributions in Konya, Erzincan and Van are news.
Life Form: Ch.
IUCN Risc category: Cd.

Gypsophila leucochleana Hub.-Mor.*:*
Malatya: Erkenek arounds, steppe, 1400 m, July 2006, Özçelik 12229 (GUL 13/24/8(2)-12-1!): **Sivas-Malatya:** Gürün Darende highway, Sivas crossroad arounds, steppe, 1400 m, July 2006, Özçelik 12209 (GUL 13/24/12-1!).
Economic importance: Unknown.
Fl.: 6-7, **Fr.:** 7-8.
Habitat: Steppe, rocky slopes, 1000-1400 m.
Geographical Distribution: Endemic, Irano-Turanian element.
Life Form: Ch.
IUCN Risc category: EN.
Gypsophila bicolor (Freyn & Sint.) Grossh.:
Erzurum: Aşkale road 27. km, steppe, 1558 m, 13.viii.2006, A. Özçelik 079 (GUL 13/24/14-5!); Erzurum-Aşkale highway, 19.5 km, steppe,1864 m, 13.viii.2006, A.Özçelik 081 (GUL 13/24/14-6!). **Iğdır:** Korhan plateu, (N of Ağrı Dağı), steppe, 1556 m, 10.viii.2006, A.Özçelik 51 (GUL 13/24/14-11!). **Bitlis:** Sübhan Dağı foothills, steppe and abandoned fields, 1850 m, 19.vii.1993, Özçelik 3158 (GUL 13/24/8-8!). **Van:** Erek Dağı, steppe, 1900 m, 1.vii.1985, Özçelik 134 (GUL 13/24/14-6!); Erek Dağı, steppe, 1850 m, 21.vi.1988, Özçelik 2611 (GUL 13/24/14-3!); from Van towards Gürpınar 11 km, steppe, 1967 m, 11.viii.2006, A. Özçelik Ç.G.G. 56 (GUL 13/24/14-4!); foothills of Erek Dağı, fields and abandoned fields, 2000 m, 21.viii.1988, Özçelik 1313 (GUL 13/24/14-7!); Erciş-Van highway, 55 km to Van, 14.vii.2007, A. Özçelik, A.S.Kaya, S. Tuğrulay et.all. ÇGG.101 (GUL 13/24/14/10-9!); Van-Gürpınar highway, 10. km, roadsides, steppe, 1800 m, 15.vii.2007, A. Özçelik, A.S.Kaya, S. Tuğrulay, ÇGG.101 (GUL 13/24/14/10-10!); 7 km from Gürpınar to Başkale, steppe, 2100 m, 15.vii.2007, A. Özçelik 01 (GUL 13/24/14-14!); Campus of Van Yüzüncü Yıl Univ., environs of Bardakçı and Zeve villages, steppe, 1700 m, 6.vii.1989, Özçelik 2610 (in VANF!); Edremit, University campus, Özçelik 2614!; Zeve village, University campus, steppe, 18.vii.1997, 1900 m, Özgökçe 1292 (in VANF!); İpekyolu, Erçek Lake district, fields, 1876 m, 30.vi.2019, Özgökçe 14617 (in VANF!); Muradiye, Tansu district, fields, 1985 m, 29.iv.2020, Özgökçe 14888 (in VANF!); Edremit, Dilkaya district, fields, 1680 m, 07.v.2020, Özgökçe 14950 (in VANF!); Muradiye, E of Sarımehmet dam, roadsides, 1986 m, 12.vii.2020, Özgökçe 15340 (in VANF!). **Bitlis-Van**: SE of Alacabük Dağı, Yoldöndü-Timar villages, the peak around, 16.vi.2002, 2000-2900 m, 38° 24′ 809″ N and 42° 44′ 942″ E, Özgökçe 10829 (in VANF!).
A.Ç. & Özçelik 056 (GUL 13/24/8-1-8!); A. Özçelik ÇGG. 82 (GUL 13/24/14-12!); A. Özçelik

ÇGG. 66 (GUL 13/24/14-13!).
From Gevaş (Van) to Tatvan (Bitlis), A. Özçelik ÇGG. 82 (GUL 13/24/14-13!); Erciş-Ahlat highway, A. Özçelik ÇGG.66 (13/24/14-12!); Özçelik 2610; It may be a hybrid with *G. arrostii*. Their identification is suspect.
Economic importance: An extract called 'Çöven' can be obtained from its thickened roots.
Fl.: 5-7, **Fr.:** 6-8.
Habitat: Steppe, fallow fields and margins, 1000-2000(-2900) m.
Geographical Distribution: Nonendemic. Irano-Turanian element. Türkiye, Caucacia, Iran, Azarbaijan, Türkistan. A rare species in Türkiye, the most abundant reserve of it is in Van Lake basin, especially in abandoned fields, near cultivated lands and partially in steppe vegetation from sea level to 1600-1800 m. It is collected from Türkiye for economic purposes particularly abundant in Van Lake Basin. Therefore, their populations were damaged. There are rich populations in parts of Azarbaijan close to Türkiye border.
Life Form: Ch.
IUCN Risc category: Lc.

Gypsophila arrostii Guss. var. ***nebulosa*** (Boiss. & Heldr.) Greuter & Burdet:
Manisa: 20 km to Saruhanlı from Akhisar, fieldsides, 64 m, 2006, A. Özçelik ÇGG. 149 (GUL 13/24/15-05!). **Konya:** Bozkır road 5. km, steppe, 1287 m, 27.vi.2006, A. Özçelik ÇGG. 130 (GUL 13/24/15-01!); M. İnan 02 (GUL 13/24/15-3!); Özçelik & Korkmaztürk 15 (GUL 13/24/15-4!); Ilgın-Beyşehir-Akseki crossroad, steppe, 1100 m, 12.viii.1996, Özçelik 7568 (GUL 13/24/15/10!). **Afyonkarahisar**: From Keçiborlu (Isparta) towards Afyonkarahisar 109. km, steppe, 1002 m, 22.6.2006, A. Özçelik (GUL 13724/15-20!); Sandıklı, fieldsides, 900 m, 6.vii.2001, Özçelik 9140 (GUL 13/24/15/11!); A.Özçelik ÇGG. 35 (GUL 13/24/15-12!); A.Özçelik ÇGG. 29 (GUL 13/24/15-13!); A.Özçelik ÇGG. 28 (GUL 13/24/15-14!); Özçelik & A.Ç., Özçelik & Korkmaztürk 09 (GUL 13/24/15-05!). **Antalya:** Elmalı-Gölova highway, 2. crossroad of the ways, 25.vi.2006, Özçelik ÇGG.01, 02 (GUL 13/24/15-07!); Korkuteli, 4.5 km to Tatköy, 26.vi.2009, Özçelik, A.Ç. & Korkmaztürk 15 (GUL 13/24/15-04!). **Isparta:** Atabey, fieldsides, 958, A. Özçelik ÇGG. 10 (GUL 13/24/15-15); A. Özçelik ÇGG. 135(GUL 13/24/15-2); A. Özçelik ÇGG. 35(GUL 13/24/15-12); Özçelik & A.Ç. 14 (GUL 13/24/15-17). Above Campus of S. Demirel Univ., dry stony places and open coniferous woods, 1250 m, 14.vi.1994, Özçelik 6638 (GUL 13/24/15-09!); Özçelik 7202 (GUL 13/24/15-6!); Kuleönü town, fieldsides, 16.vii.2004, M.İnan 02 (GUL 13/24/15-09); 16 km to Yalvaç from Gelendost, steppe, 972 m, 2006, A. Özçelik, K. Aydınşakir Ç.G.G. 134 (GUL 13/24/15-13); 29 km to Beyşehir from Şarkikaraağaç, fieldsides, 1182 m, A. Özçelik, K. Aydınşakir Ç.G.G.133(GUL 13/24/15-14). **Burdur:** Lake Burdur environs, fieldsides, 900 m, 5.iv.2017, Özçelik 14363 (GUL 13/24/15-16!). A. & Özçelik 14 (GUL 13/24/15-17!); A.Ç. & Özçelik 2669 (GUL 13/24/15/32-18!); Yeşilova, opens of forest, 982 m, A. Özçelik ÇGG. 137 (GUL 13/24/15-08!).
Halva makers use its roots. Its root is sold abroad. It is closely allied to *G. bicolor* and *G. paniculata* but has smaller flowers and linear oblong leaves.
Economic importance: An extract called 'Çöven' can be obtained from its thickened roots.
Fl.: 4-6, **Fr.:** 7-10.
Habitat: Fieldsides, opens of forest, steppe, dry stony places and open coniferous woods, 900-1300 m.
Geographical Distribution: It is an endemic to the Lakes Region. Irano-Turanian element. It is partially cultivated in the region.
Life Form: Ch.
IUCN Risc category: Cd.

Gypsophila simulatrix Bornm. & Woron.:
Niğde: From Ulukışla towards Ereğli 8 km, 1053 m, 15.viii.2006, A. Özçelik ÇGG.119-120 (GUL 13/24/16-1, 2!). **Erzurum:** Near Tortum Lake, slopes, ±1050 m, 20.vii.1990, Özçelik 2299 (GUL 13/24/16-3!); 3 km SW of Oltu, steppe, 1350 m, 15.vii.1989, Özçelik 2592. **Konya:** Ilgın-Beyşehir-Akseki highway, crossroad, 33 km to Ilgın, steppe, 1100-1200 m, Özçelik 7558 (GUL 13/24/17/24-26!); A.Özçelik ÇGG. 106 (GUL 13/24/16-4!); A. Özçelik 116 (GUL 13/24/17-46-47!); A. Özçelik (GUL 13/24/17-24!); A. Özçelik (GUL 13/24/17-26!). **Niğde:** Ulukışla, A. Özçelik 116. **Afyonkarahisar:** A. Özçelik (GUL 13/24/17-48).

Ankara-Afyonkarahisar: 100 km to Afyonkarahisar and 5 km to Gülçayır, gibsous area, 860-900 m, Özçelik 12875 (GUL1 3/24/17-49-57**!**); Özçelik 12876 (GUL 13/24/17-58-59**!**) are problematic. Its spreading is interesting.
Economic importance: Unknown. It may be used as arrangement in ready flower.
Fl.: 5-6, **Fr.:** 7-8.
Habitat: Gibsous area, steppe, limestone rocky places and slopes, (500-) 800-1350 m. An indicator of gypsum areas.
Geographical Distribution: Endemic, Irano-Turanian element. Distribution of this species is known only from Prov. Artvin, Erzurum and Kars.
Life Form: Ch.
IUCN Risc category: Lc.

Gypsophila perfoliata L. var. *perfoliata*:
Ağrı: Doğubeyazıt, Büyük Ağrıdağı, W slope, steppe, 1600 m, 16.vii.1990, Özçelik 2295 (GUL 13/24/17-18**!**). **Iğdır:** Taşburun, Kireçbağı village to Karasu river, sides in little salty steppe, 800 m, 18.vii.1984, Tatlı 7687 (GUL 13/24/17-22**!**). **Van:** E of Özalp, roadsides and steppe, 1995 m, 10.viii.1994, Özgökçe 2000; 2001 (in VANF; GUL 13/24/17-20**!**). **Bitlis:** SW slopes of Alacabük Dağı, from Alacabük village to the peak, steppe, 04.vi.2002, 3000 m, Özgökçe 10727**!** (in VANF**!**). **Erzincan:** Aşkale-Tercan-Erzincan road 14. km, 1176 m, 13.viii.2006, A. Özçelik Ç.G.G.91(GUL 13/24/17-30**!**). **Yozgat:** Boğazlayan-Sarıkaya crossroad (from Boğazlayan), roadsides, clayed area, 1053 m, 6.8.2006, A. Özçelik Ç.G.G. 44 (GUL 13/24/17-25**!**). **Sivas:** Cumhuriyet Univ. Campus crossroad, steppe, 1249 m, 8.vii.2007, A.Özçelik & K.Aydınşakir 2, 3 (GUL 13/24/17-02, 03**!**); 5 km from Zara to Erzincan, steppe, 8.vii.2007, m, A. Özçelik, A.S. Kaya & S. Tuğrulay (GUL 13/24/17-05**!**); 20 km from Sivas to Ulaş, roadsides, 1344 m, 8.vii.2007, A. Özçelik, K.Aydınşakir 1 (GUL 13/24/17-06**!**); Gürün, entrance to the city, terrain, 8.vii.2007, A.Özçelik, K.Aydınşakir (GUL 13/24/17-07**!**); (GUL 13/24/17-08**!**); 24 km from Sivas to Gürün, steppe, 1349 m, 14.8.2006, A. Özçelik Ç.G.G. 100,101 (GUL 13/24/17-27, 28**!**); 17 km from Gürün towards Malatya, steppe, 14.viii.2006, A.Özçelik Ç.G.G. 99 (GUL 13/24/17-31**!**); Zara-Hafik highway 10. km, steppe, 1317 m, 13.viii.2006, A.Özçelik 96 (GUL 13/24/17-32**!**). **Adana?:** M.İnan (GUL 13/24/13-2**!**). **Niğde:** 15. Km from Ulukışla to Ereğli, steppe, 1068 m, 15.viii.2006, A.Özçelik Ç.G.G. 118 (GUL 13/24/17-01**!**); from Ulukışla to Ereğli(Konya) 26,7 km(16 km to Ereğli), steppe, 1079 m, 15.viii.2006, A. Özçelik Ç.G.G. 115 (GUL 13/24/17-07**!**); 15 km from Ulukışla to Ereğli, steppe, 1068 m, 15.viii.2006, A. Özçelik Ç.G.G. 117 (GUL 13/24/17-26**!**). **Konya:** 30. Km from Konya to Karaman, roadsides, stream bads and pastures, 1200 m, 19.vii.1994, Özçelik 6683 (GUL 13/24/17-19**!**); Karapınar-Ulukışla highway, 30 km from Karapınar, steppe, 1350 m, 24.vii.1999, Özçelik 7967 (GUL 13/24/17-21**!**). **Afyonkarahisar**: Emirdağı-Eskişehir highway, 2 km to Belpınar village crossroad, fieldsides and gypsous steppe, 980 m, Özçelik & A.Ç. 29(GUL 13/24/17-17**!**). **Denizli, Isparta, Ankara, Kayseri** (by our area observations). A. Özçelik & K. Aydınşakir 04 (GUL 13/24/17-27**!**); Özçelik & A.Ç. 19 (GUL 13/24/17-29-30**!**); A. Özçelik & K. Aydınşakir ÇGG. 115 (GUL 13/24/17-31**!**); Özçelik & A.Ç. 34(GUL 13/24/17-32-37**!**). A.Özçelik 116 (GUL 13/24/17-04**!**); A.Ç. Özçelik and Korkmaztürk 32(GUL 13/24/17-09**!**); A.Ç. & Özçelik 29 (GUL 13/24/17-10**!**); Muca & Özçelik 29 (GUL 13/24/17-11**!**); A.Ç. & Özçelik 18 (GUL 13/24/17-12**!**); A.Ç. & Özçelik 19 (GUL 13/24/17-13**!**); A.Ç. & Özçelik 34 (GUL 13/24/17-14**!**); Özçelik & Muca 31 (13/24/17-16**!**); A.Özçelik (GUL 13/24/17-29**!**). A. Özçelik ÇGG. 61(GUL 13/24/8-1).
Economic importance: An extract called 'Çöven' can be obtained from its thickened rhizomes.
Fl.: 6-8, **Fr.:** 7-8.
Habitat: Fieldsides and gypsous steppe, saline soils, roadsides, stream bads and pastures, (350-) 800-1350 (-2000) m. An indicator of gypsum areas.
Geographical Distribution: Nonendemic. Türkiye, Romenia, Bulgaria, S of Russia, Ucrania, W. of Siberia, S.W. and C. Asia. This taxon is common in Türkiye, especially in Central Anatolia and Lakes Regions. Irano-Turanian element.
Life Form: Ch.
IUCN Risc category: Lc.

Gypsophila perfoliata L. var. *araratica* Kit Tan:
This taxon recorded from Ağrı vilayet. It grows in 1500 m altitude and dry places. It is not seen

by us.

Gypsophila venusta Fenzl. subsp. ***venusta:***
Yozgat: Çayıralan, Sarıkaya, Babayağmur town, 5. km, roadsides and fieldsides, 1330 m, A.Özçelik & Aydınşakir ÇGG. 140 (GUL 13/24/42-1). **Afyonkarahisar:** Çifteler crossroad, around Bağören village, fieldsides, 18.vi.1980, Ö. Seçmen 2260 (EGE 17517!). **Ankara:** 4 km from Şereflikoçhisar to Gölbaşı, steppe, 30.vi.2006, 995 m, A. Özçelik & K. Aydınşakir Ç.G.G. 11 (GUL 13/ 24/46-06!). **Konya:** Sarayönü-Cihanbeyli highway, 52. km, steppe, 1037 m, A. Özçelik Ç.G. 93 (GUL 13/ 24/46-09!); 12,5 km from Seydişehir to Bozkır, steppe, 27.vi.2006, 1217 m, A. Özçelik Ç.G. 20, 22 (GUL 13/ 24/46-10!); 18 km from Seydişehir to Bozkır, steppe, 27.vi.2006, 1125 m, A.Özçelik Ç.G.20, 22 (GUL 13/ 24/46-07!). **Isparta:** 18 km Şarkikaraağaç to Beyşehir, steppe, 27.vi.2006, 1148 m, A. Özçelik Ç.G. 28(GUL 13/ 24/46-08!). A.Ç. & Özçelik 13(GUL 13/24/46-01!); A.Ç. & Özçelik 14 (GUL 13/24/46-02!); Özçelik 12336 (GUL 13/ 24/46-03!); Özçelik 12776(GUL 13/ 24/46-04!).
Economic importance: An extract called 'Çöven' can be obtained from its thickened roots for halva production.
Fl.: 5-7, **Fr.:** 6-8.
Habitat: Gypsum areas, roadsides and fieldsides, fallow fields, steppe, (350-)1000-1350 (-1600) m. An indicator of gypsum areas.
Geographical Distribution: Nonendemic, Irano-Turanian element. Yozgat is new and interesting distribution record.
Life Form: Ch.
IUCN Risc category: Cd.

3.2.21.2. ***Gypsophila venusta*** Fenzl. subsp. ***staminea*** Özçelik & Özgökçe:
Type: Erzurum: Aşkale-Erzincan highway, 40 km from Aşkale, steppe, 2200 m, 23.vii.1993, Özçelik 6225! (in GUL).
Erzurum: Aşkale-Tercan 22. km, steppe, 1588 m, 2006, A. Özçelik Ç.G.G. 88 (GUL 13/ 24/46-05). The area is almost type locality of the species.
Economic importance: Unknown.
Fl.: 7, **Fr.:** 7-8.
Habitat: Steppe, 1600-2200 m.
Geographical Distribution: Local endemic, Irano-Turanian element**.**
Life Forms: Ch.
IUCN Risc category: CR. Fig. 2.

Figure 2: ***Gypsophila venusta:*** **1: subsp.** ***venusta*****, A.Özçelik & Aydınşakir ÇGG. 140, 2:** ***G. v.*** **subsp.** ***staminea*****, Özçelik 6225 sheets.**

Gypsophila simonii Hub.-Mor.:
Sivas: 10 km from Zara to Hafik, steppe, 1317 m, 13.viii.2006, A.Özçelik Ç.G.G. 96 (GUL 13/24/18-8!). M.K.48 (GUL 13/24/18-01!).
Economic importance: Unknown.
Fl.: 7, **Fr.:** 7-8.
Habitat: Gypsous steppe, salty places, 700 m.
Geographical Distribution: Local endemic, Irano-Turanian element. Sivas Prov. is a new record of it. It is known from Çankırı and Sivas prov.
Life Form: Ch.

IUCN Risc category: CR.

Gypsophila oblanceolata Barkoudah:
Isparta: M.K. 67 GUL 13/24/19-01!); **Konya:** 28.vii.2010, A.Ç. (GUL 13/24/19-02!).
Economic importance: Unknown.
Fl.: 6-8, **Fr.:** 7-9.
Habitat: Salty marshes, moisty steppe, c. 1000 m.
Geographical Distribution: Endemic, Irano-Turanian element.
Life Form: Ch.
IUCN Risc category: VU.

Gypsophila germanicopolitana Hub.-Mor.:
Yozgat: 20 km from Sarıkaya to Çayıralan, roadsides and rocky places, 1209 m, 7.vii.2007, A. Özçelik & K. Aydınşakir (GUL 13/24/20-01!). **Kayseri:** Kayseri-Kırşehir highway, 36. km, roadsides, calcered places, 1125 m, 6.viii.2006, A. Özçelik Ç.G.G. 43 (GUL 13/24/20-02!). **Sivas:** Entrance of Gürün district, steppe, stony, sandy loamy soils, 8.vii.2007, A. Özçelik (GUL 13/24/20-03!); A.Özçelik & K. Aydınşakir 03 (GUL 13/24/20-04).
Economic importance: Unknown. It may be used as arrangement in ready flower.
Fl.: 6-8, **Fr.:** 7-9.
Habitat: Gypsum slopes, c. 750 m. It is an indicator of salty and gypsum areas. It prefers basic habitats**.**
Geographical Distribution: Endemic, Irano-Turanian element. It was only known before type was collected from Çankırı. Its distribution area has expanded with new findings.
Life Form: Ch.
IUCN Risc category: VU.

Gypsophila curvifolia Fenzl:
Isparta: Yenişarbademli, Dedegül dağı, Pınargözü locality, moisty areas, 1600 m, 21.viii.1995, Özçelik 7335 (GUL 13/24/22-01!); Sütçüler, moist steppe, 1700 m, M.K. 897 (GUL 13/24/22-02!). **Adana:** Pozantı, from Maden village to Meydan village, alpinic steppe, 2300-2500 m, 25.vii.1999, Özçelik 8038 (GUL 13/24/22-03.
Economic importance: Unknown.
Fl.: 6-8, **Fr.:** 7-9.
Habitat: Moist steppe, alpinic steppe, (1000-) 1600-2500 m. It is indicator of moist steppe.
Geographical Distribution: Endemic, Mediterranean element. It grows in Lakes Region and environs in general.
Life Form: Ch.
IUCN Risc category: Lc.:

Gypsophila libanotica Boiss.:
Özçelik & A.Ç. 02(GUL 13/24/24-01!):
Economic importance: Unknown.
Fl.: 6-8, **Fr.:** 7-8.
Habitat: Rocky slopes, mountain steppe, (1200-) 1700-1900 (-2400) m.
Geographical Distribution: Nonendemic; Türkiye and Lebanon. A rare species for Türkiye. It grows at the intersection of Central Anatolia and the Mediterranean region. Mediterranean element.
Life Form: Ch.
IUCN Risc category: Cd.

Gypsophila ruscifolia Boiss.*:*
Kahramanmaraş: From Narlı (Pazarcık) to Gaziantep 20 km (from old road), 913 m, 14.viii.2006, A.Özçelik Ç.G.G. 112 (GUL 13/24/25-1!); A.Özçelik Ç.G.G. 278(GUL 13/24/25-2!); Özçelik & Muca 08, 10 (GUL 13/24/25-3!). **Şanlıurfa:** A.Özçelik Ç.G.G. 64 (GUL 13/24/25-4!); Özçelik and Muca 10 (GUL 13/24/25-6). **Ağrı:** Adilcevaz (Bitlis)-Patnos (Ağrı) road, 15,78 km to Patnos, A.Özçelik Ç.G.G. 77 (GUL 13/24/25-5!). **Siirt:** Aydınlar (Tillo), around İ. Hakkı Hz. Tomb, steppe, 1050 m, 1.vii.1988, Özçelik 2575 (GUL 13/24/25-06, 08!). **Van:** Küçük Erek Dağı, near the church ruin, steppe, 2250 m, 18.v.1986, Özçelik 752 (790; 6608 (GUL 13/24/25-07!); Kavuşşahap Dağları, Bahçesaray (Müküs) Narlıca village, steppe, 2300 m, 7.vii.1988, Özçelik (together with G.Ay) 2244 (GUL 13/24/25-09!); 2 km from Özalp to Saray district, steppe, 2000 m, 26.vii.1996, Özgökçe 544!; Gevaş, Kuzgunkıran Pass, steppe, 2235 m, 20 vii 1997, Özgökçe 1740 (in VANF!); Gevaş, Alacabük Dağı, Kusgunkıran Geçidi, roadsides, 2370 m, 19.vii.2020, Özgökçe 15378(in VANF!); Gürpınar, Norduz plateu, steppe, 2450 m, 13.vii.2010, Özgökçe 13766 (VANF!); Gevaş, N slopes of Alacabük Dağı, E of Altınsaç church tombldown, steppe, 10.vii.2001, 2900 m, Özgökçe 9406 (in VANF!). **Bitlis/Van:** Alacabük Dağı, SE slopes of it, from Timar to the peak, 01.vi.2002, 2350 m, Özgökçe 10606 (in VANF!).

A.Özçelik G. 82, 113, 115, 180, 184, 196, 199, 201, 202, 238, 242, 443(**!**); Özçelik & Muca 11 (GUL 13/24/25-10**!**).
Its flowering is very important in recognition of the species. A very distinct speecies. In Siirt, Adıyaman, Gaziantep, Sanlıurfa, it is rich in potential. Rocky peaks in Southeastern Anatolia Region is an important differentiation center.
Economic importance: An extract called 'Çöven' can be obtained from its thickened roots.
Fl.: 6-7, **Fr.:** 7-8.
Habitat: Steppe, dry slopes, 800-1800 m.
Geographical Distribution: Nonendemic. Türkiye, Lebanon, Iraq, Iran, Syria. Irano-Turanian element.
Life Forms: Ch.
IUCN Risc category: Lc.

Gypsophila pallida Stapf:
Ankara: Ankara Univ., around Agriculture Faculty, M. İnan 01 (GUL 13/24/26-01**!**). **Van:** Bahçesaray-Çatak crossroad, steppe, 2100 m, Aug. 1991, Özçelik 2621(GUL 13/24/26-2**!**); Çatak district, Bilgi village (38º06'191''E, 43º16'215''N), roadsides, 1734 m, 05.vi.2010, Özgökçe 13710 (in VANF**!**). **Hakkari:** Near Zap stream, 60 km to Hakkari, steppe, 2200 m, 14.viii.1991, Özçelik 2558 (GUL13/24/26-3**!**). **Van:** Bahçesaray (Müküs) district, Kavuşşahap dağları, steppe, 2200 m, August 1991, Özçelik 2621(13/24/26-02-04.**!**).
Economic importance: Unknown.
Fl.: 6-8, **Fr.:** 7-8.
Habitat: Steppe, dry rocky hills, roadsides, (850-)1000-2200 m.
Geographical Distribution: Nonendemic. Türkiye, Iraq, Iran, Syria. Irano-Turanian element. Distribution of this species, which is known to be distributed from Eastern Anatolia, in Central Anatolia region (Ankara) is a new record.
Life Form: Ch.
IUCN Risc category: Cd.

Gypsophila tuberculosa Hub.-Mor.:
Erzurum: Tortum waterfall around, steppe, about 1100 m, 20.vii.1993, Altan & Özçelik 6138; July 1993, Özçelik 6138 (GUL 13/24/27-1**!**): Tortum waterfall around, steppe, 950 m, 9.vi.1993, Özçelik 56!
Economic importance: Unknown.
Fl.: 6-7, **Fr.:** 7-8.
Habitat: Steppe, dry stream banks, 1300-1900 m.
Geographical Distribution: Rare, endemic. Irano-Turanian element. Distribution of this species, which is known to be distributed from Erzincan, Erzurum is a new record.
Life Forms: Ch.
IUCN Risc category: CR.

Gypsophila aucheri Boiss.:
Bitlis: Tatvan, W slopes of Alacabük Dağı, from Dağdibi to the peak, sleopes, 22.viii.2004, 2500 m, 38° 25' 246" N ve 42° 44' 950" E, Özgökçe 12448 (in VANF**!**). **Erzincan:** Centrum, steppe, about 1500 m, 14.viii.1989, Özçelik 2251 (Leg. Y. Kaya; GUL 13/24/28-03**!**). **Erzincan-Erzurum:** 10 km to Aşkale, steppe and roadsides, about 1900 m, 17.x.1990, Özçelik 2253 (GUL 13724/28-04**!**); 25. km from Erzincan to Tercan, 13.viii.2006, 1420 m, A. Özçelik 89 (GUL 13/24/28-5**!**). **Malatya:** Doğanşehir-Gölbaşı highway, 20 km, steppe, 14.viii.2006, A. Özçelik 111, 1082 (GUL 13/24/28-6**!**). **Erzincan:** 40 km to Tercan, A.Özçelik, A.S. Kaya, S. Tuğrulay, A. Özçelik 143 (GUL 13/24/28-7**!**). **Erzurum:** Erzincan-Erzurum highway, 120 km to Erzurum, steppe, 1600 m, 11.ix.1992, Özçelik 2882.
It grows abundantly in Erzincan. It is a habitat-selective species.
Economic importance: It may be important for rock gardens.
Fl.: 6-8, **Fr.:** 7-10.
Habitat: Dry stony slopes, steppe and roadsides, 1200-1600 (-1900) m.
Geographical Distribution: Endemic. Irano-Turanian element. Distribution of this species, which is known to be distributed from Tunceli and Sivas; distributions in Erzurum, Malatya, Bitlis are new records.
Life Form: Ch.
IUCN Risc category: VU.

Gypsophila eriocalyx Boiss.:
Çorum: Iskilip-Çorum highway, 10 km past (40 40 037 N, 3431020 E), steppe, 758 m **(**GUL 13/24/29-01**!**). **Sivas:** Çayıralan-Gemerek highway, the exit of Sızır town, stony areas, 1360 m, A. Özçelik & K. Aydınşakir (GUL 13724/29-2**!)**; 38 45 601'N 34 37 018 E, stony areas, 915 m, 20.vii.2008 (GUL 13724/29-03**!**);

Zara, Acısu locality, steppe, 1600 m, 10.ix.1992, Özçelik 3163 (GUL 13724/29-04!). **Çankırı:** Kalecik-Çankırı highway, 15 km to Çankırı, chalky steppe, 688 m, 21.vii.2008 (GUL 13/24/29-5!).
Economic importance: It may be important for rock gardens.
Fl.: 6-8, **Fr.:** 7-8.
Habitat: Gypsum banks and steppes, 600-1600 m. It is obvious that this species is an indicator of gypsum areas in Central Anatolia. An indicator of gypsum areas.
Geographical Distribution: Endemic, Irano-Turanian element. Erzincan is a new record.
Life Forms: Ch.
IUCN Risc category: Lc.

Gypsophila lepidioides Boiss.:
Ankara-Afyonkarahisar: Adana highway, 100 km to Afyonkarahisar, 3918526N, 03126528E, gibsum areas, 860-900 m, 4.vii.2010, Özçelik 12876 (GUL 13724/30-1!). **Erzincan**: Keşiş dağı, on vulcanic rocks (observed in the area). It was known as local endemic from Erzincan. Distribution of this species, which is known to be distributed from Erzincan; distributions in Ankara, Afyonkarahisar are new records.
Economic importance: It may be important for rock gardens.
Fl.: 7, **Fr:** 7-8.
Habitat: Gypsum areas, steppe, on vulcanic rocks, 800-1000 m.
Geographical Distribution: Endemic, Irano-Turanian element. It was not seen in the Cappadocia. *G. eriocalyx* is abundantly grows in this area. General appearences of the two species resemble one to other.
Life Form: Ch.
IUCN Risc category: CR.

Gypsophila heteropoda Freyn & Sint.
subsp. ***heteropoda:***
M.K. G. 314 (GUL 13/24/32-1!). A.Ç. 49 (GUL 13/24/33-1!): The population was evaluated as a hybrid of *G. parva* and *G. heteropoda* subsp. *heteropoda.*
Economic importance: Unknown.
Fl.: 5-7, **Fr.:** 6-8.
Habitat: Gypsous steppe, 1300-1500 m. An indicator of gypsum areas.
Geographical Distribution: Nonendemic, Irano-Turanian element. Eastern Anatolia region in Türkiye, Iraq, Iran, Afghanistan, Transcaspia.
Life Form: T.
IUCN Risc category: Lc.

Gypsophila heteropoda Freyn & Sint. subsp. ***minutiflora*** Barkoudah:
Fl.: 5-7, **Fr.:** 6-8.
Economic importance: Unknown.
Habitat: Gypsous steppe, humid steppe, bottom land, salt steppe, 1200-1400 m. An indicator of gypsum areas.
Geographical Distribution: Endemic, Irano-Turanian element. It was observed only in partially humid steppe, low altitude lands in Sivas.
Life Form: T.
IUCN Risc category: CR.
Gypsophila parva Barkoudah:
A.Ç. 49 (GUL 13/24/33-1!).
Economic importance: Unknown.
Fl.: 5-7, **Fr.:** 6-8.
Habitat: Gypsum steppe, dry hills, 600-700 m. An indicator of gypsum areas.
Geographical Distribution: Endemic, Irano-Turanian element. Central Anatolia region.
Life Form: T.
IUCN Risc category: Lc.

Gypsophila elegans Bieb.:
Konya: Karapınar road, 45. km, stony and dry places, 1004 m, 6.vii.2007, A.Özçelik & K. Aydınşakir (1. sample) Ç.G.G. 121 (GUL 13/24/35-1!); A.Özçelik & K. Aydınşakir Ç.G.G. 150 (GUL 13/24/35-2!). It is similar to *G. bitlisensis.* Because length of calyx is long and petals short. It can be a population as result of hybridization.
Van: Erciş highway, 40-45 km, pasture, 1900 m, 21.v.1995, Özgökçe 2255, 2256 (GUL 13/24/35-3!); Özgökçe 2257, 2282 (GUL 13/24/35-4!); Özgökçe 2278, 2279 (GUL 13/24/35-5!): These populations could be a hybrid between *G. munzurensis* and *G. elegans*. Because, the characteristics of the populations confused with *G. munzurensis.* Or, a difference may have occurred due to the fact that the growing environment is a meadow. If there is a change in population depending on habitat. *G. munzurensis* (a newly named species) must have

been a subspecies of *G. elegans.*

Bitlis: Adilcevaz, Aydınlar village, sandy, gravelly steppe, 2200 m, 9.vii.1987, Özgökçe 2276 (GUL 13/24/35-6!); Özgökçe 2280, 2281(GUL 13/24/35-7!); Özgökçe 2253(GUL 13/24/35-8!); Özgökçe 2272 (GUL 13/24/35-9!); Özgökçe 2252(GUL 13/24/35-10!); Özgökçe 2274(GUL 13/24/35-11!); Özgökçe 2250 (GUL 13/24/35-12!); Özgökçe 2249 (GUL 13/24/35-13!); Özgökçe 2248 (GUL 13/24/35-14!); Özgökçe 2247 (GUL 13/24/35-15!); Özgökçe 2242 (GUL 13/24/35-16!); Özgökçe 4158 (GUL 13/24/35-20!): Most of these examples are very similar to *G. elegans*. Some of the characteristics of them confused with *G. munzurensis.*

Tatlı 4914 (GUL 13/24/35-17!); ATA 620 (GUL13/24/35-19**.**

Sivas: From Refahiye to Sivas, 3 km, steppe, 1594 m, 2006, A. Özçelik Ç.G.G.94 (GUL 13/24/35-19); Özçelik 2245 (GUL 13/24/35-18!). **Van:** Gürpınar, Norduz plateu, steppe, 2450 m, 13.vii.2010, Özgökçe 13769 (in VANF!**)**. **Bitlis:** Adicevaz, Aygırgölü plateu, field and its sides, 1940 m, 15.viii.2011, Özgökçe 13865 (in VANF!**)**. **Bitlis-Van:** SE slopes of Alacabük Dağı, Yoldöndü-Timar villages, peak of the mount, 16.vi.2002, 2000-2900 m, 38°24'809" N and 42° 44' 942" E, Özgökçe 10828 (in VANF!**)**. **Ardahan:** Kuzukaya village, Kura Çayı, steppe, 30.v.2021, 41˚17'225"N-42˚49'903"E, 2105 m, Özgökçe 16160 (in VANF!**)**.; Centrum, Hasköy, steppe, 13.viii.2021, 40°59'32.34" N 42°52'58.26" E 1996 m, Özgökçe 16461(in VANF!**)**. **Iğdır:** Büyük Ağrıdağı, Korhan yaylası sosyal tesisleri (39º 47' 18.01'' N 44º 15' 41'' E), alpinic meadow, 1958 m, 31.v.2014, Özgökçe 11763 (in VANF!). Its population is very good between Konya and Karapınar.

Economic importance: It may be important for florist.

Fl.: 5-8, **Fr.:** 7-9.

Habitat: Dry steppe, roadsides, slopes, alpinic meadow, sandy, gravelly steppe, field and its sides, pasture, (1000-) 1300-2500(-2900) m. It is the dominant species in some areas. It prefers swollen soils. It does not like swollen young soils.

Geographical Distribution: Nonendemic, Irano-Turanian element. Central, Eastern and NE Anatolia regions in Türkiye, Iran, Caucasia, Russia. Distributions in Konya, Iğdır, Ardahan, Sivas, Bitlis, Van are news.

Life Forms: T.

IUCN Risc category: Lc.

Gypsophila silenoides Rupr.*:*

Trabzon: Sürmene, Madur Mountain, steppe, 2200 m, 24.vii.1992, Berber 249 (GUL 13/24/35-1!); Çaykara, Uzungöl-Soğanlı highway, ca. 2300 m, 15.viii.1984, Özçelik (GUL 13/24/35-2!); Özgökçe 6571-b. (GUL 13/24/36-03!). Seçmen, Gemici, Tabata, Yasuda (EGE 28155!). **Bitlis-Van:** NW slopes of Alacabük Dağı, from in village to peak, steppe, 38° 25' 220" N ve 42° 45' 302" E, 19.vi.2002, 2640-2870 m, Özgökçe 10942 (VANF!**)**.

Economic importance: Unknown.

Fl.: 6-8, **Fr.:** 7-9.

Habitat: Banks, stony slopes, pastures, 1800-2870 m.

Geographical Distribution: Nonendemic, Türkiye and Caucasia. Euxine element. Distribution area in Türkiye is only in Eastern Black sea region. It is abundant growing on stony slopes in the region. Distributions in Bitlis and Van are new records.

Life Form: Ch.

IUCN Risc category: Lc.

Gypsophila bitlisensis Barkoudah:

Erzurum: Aşkale road, 28. km, steppe, 13.viii.2006, 1867 m, A.Özçelik Ç.G.G. 80 (GUL 13/24/37-01!): Horasan, entrance of the city from Ağrı, steppe and roadsides, 21.vii.1990, Özçelik 2264 (GUL 13/24/37-11!); 1993, Aşkale, steppe, 1900 m, Özçelik 5173 (GUL 13/24/37-3!); Ağrı road, 86 km, steppe, 1800-2200 m, A.Özçelik 108 (GUL 13724/37-03!); Özçelik 7206 (GUL 13/24/37-04!); A. Özçelik Ç.G.G. 106 (13724/37-10!); To İspir, Rizekent to Çığrıklı villages, steppe, on sandstone bedrock soils, 2100 m, 22.vii.1976, A. Tatlı 4914 (GUL 13724/37-08!). It is very different population. It may be a new species. **Bitlis:** Tatvan, Nemrut Dağ, top and N of the Yumurta Tepe, sandy alpine steppe, 2250-2350 m, 5.viii.1972, A.Tatlı 717 (GUL 13/24/37-06!); Tatlı 2101(GUL 13/24/37-07!); Tatvan, Nemrut Dağı, around Ilıkgöl, 2295 m, 12.viii.2006, A.Özçelik Ç.G.G. 74 (GUL 13/24/37-13!); Ahlat-Adilcevaz, Süphan Dağı, steppe, 2200-2800 m, 28.vii.1988, Özçelik

1711 (GUL 13724/37-05**!**). It is interesting population which must be a new species. Endemic for Lake Van basin. **Van:** N of the village of Beyüzümü, in sandy and gravelly areas, 1740-1780 m, 31.vii.1994, Özgökçe 1971 (VANF 16267**!**); Gürpınar, between Hoşap-Fedaitaşı (38°10'102''E, 43°53'240''N), steppe, 2950 m, 30.vi.2010, Özgökçe 13754 (VANF**!**). Özalp, Kaşıkara village to Aşkın village, steppe, 2000 m, 18.vi.1998, Özgökçe 6571 (VANF 16269**!**). **Sivas:** Zara, Erzincan highway 10 km, steppe, 13.vii.2007, A.Özçelik (GUL 13724/37-09**!**). **Bitlis/Van:** E slopes of Alacabük Dağı, from Aydınocak village to peak, 27.vi.2002, 2650 m, Özgökçe 11018 (VANF**!**). **Iğdır**: Büyük Ağrıdağı, behind Korhan Jandarma Karakolu (39° 47' 21 04'' N 44° 16' 08.07''E), alpinic pastures, 1916 m, 27.vi.2013, Özgökçe 11271 (in VANF**!**).
A.Ç & Muca & Özçelik 03(GUL 13/24/37-14**!**).
Economic importance: An extract called 'Çöven' can be obtained from its thickened roots for halva production.
Fl.: 6-8, **Fr.:** 7-8.
Habitat: Steppe and roadsides, on sandstone bedrock soils, sandy alpine steppe, 1650-1900 (-2950) m.
Geographical Distribution: Endemic. Irano-Turanian element. Over time, it spread to the Eastern Anatolia region. Distribution in Sivas and Iğdır are new records.
Life Form: T.
IUCN Risc category: NT.

Gypsophila viscosa Murray:
Isparta: Çünür, SDU. behind the Credit and Dormitories Institution, maquis deficits, 1050 m, 6.vi.1999, Özçelik 7898 (GUL 13/24/38-1**!**); **Kars:** Kafkas Univ. campus, roadsides, 1900 m, 4.ix.2019, Özçelik 15566 (GUL 13/24/38-2**!**); Özgökçe 2669 (GUL 13/24/38-3**!**); A.Ç., Muca & Özçelik 01 (GUL 13/24/38-4**!**). **Ankara:** 33 km to Şereflikoçhisar, steppe, 976 m, 30.vi.2006, A. Özçelik & K. Aydınşakir Ç.G.G. 09 (GUL 13/24/38-5**!**). **Konya:** Cihanbeyli-Kulu highway, 20 km from Kulu, 30.vi.2006, A.Özçelik & K.Aydınşakir Ç.G.G. 36(GUL 13/24/38-6**!**). It is closely related or hybridized with *G. bitlisensis*.
Economic importance: Unknown.
Fl.: 6-9, **Fr.:** 7-9.
Habitat: River banks, steppe, fallow fields, roadsides, 350-1900 m. The specimen Özçelik 15566 collected from Kars. It is a different example. This area is very important diversity center.
Geographical Distribution: Nonendemic, Türkiye, Syria, Palaestina, Aegypt, Arabia, Lebanon. Irano-Turanian element.
Life Form: T.
IUCN Risc category: Lc.

Gypsophila antari Post & Beauverd:
Adıyaman-Şanlıurfa: Highway, steppe, 640 m, 9.vi.2009, Özçelik 12764 (GUL 13/24/39-1**!**).
Economic importance: Unknown.
Fl.: 4-6, **Fr.:** 6-7.
Habitat: Rocky and sandy places, fieldsides, 100-400 m.
Geographical Distribution: Nonendemic, Rare. Türkiye, Syria and Arabia. Saharo-Arabian element. It was recorded from Şanlıurfa (Akçakale). It grows on fieldsides or hills near Syrian border. It is a rare species. This area is in a desert climate. It is not easily seen in land, it is difficult to recognize and its population is weak. This species was recorded in 'Flora of Turkey…' from Şanlıurfa, Akçakale district. It is a Saharo-Arabian element. It is a rare plant.
Life Form: T.
IUCN Risc category: VU.
Akçakale (Şanlıurfa) was visited by us, but no specimen of *G. antari* was found. Accuracy of samples found and identified is questionable. Another example was seen during our revision studies. Although this example fits *G. antari* from the key (Davis, 1967).

Gypsophila muralis L.*:*
Tekirdağ: Silivri to Çorlu highway, 10 km to Çorlu (41'07'' 304N, 27'53''824E), 165 m, 25.vii.2008, A.Özçelik (GUL 13/24/40-1, 2**!**). A.Ç. & Özçelik 17.vi.2009 (GUL 13/24/41-1).
Economic importance: Unknown.
Fl.: 5-7, **Fr.:** 7-8.
Habitat: Fields and roadsides, 50-200 m.
Geographical Distribution: Nonendemic, Rare. Türkiye, Europe, Caucasia, Siberia. Euro-Siberian element. *G. muralis* is the most widely distributed species in this section. It is nearly cosmopolitan. It is only found in Thrace for Türkiye and that its habitat is a ruderal. It is doubts whether an indigenous European species. Specimens of *G. muralis* in Türkiye and Europe are different from each other. However,

the diagnostic key indicates the same species. These examples are controversial whether the subject of different species or type polymorphic. This species has many homotypic and heterotypic synonyms (Anonymous, 2023b). More detailed research should be done. *G. torulensis* M. Koç is described from the Torul district (Gümüşhane Province). The species was collected from calcareous rocks, at an altitude of 1100 m a.s.l. (Koç, 2013). The new species resembles *G. muralis.*
Life Form: T.
IUCN Risc category: Lc.

Gypsophila tubulosa (Jaub. & Spach) Boiss.:
Afyonkarahisar: Dinar-Sandıklı, Sultan dağları, steppe, 1450 m, 12.viii.1999**,** Özçelik 8260 (in GUL Hb.); **Aydın, İzmir, Denizli, Uşak** (observed in the areas). A.Ç. 17 (GUL 13/24/41-01!).
Economic importance: Unknown.
Fl.: 5-8, **Fr.:** 6-8.
Habitat: Machhie, steppe, 100-1450 m.
Geographical Distribution: Endemic, Mediterranean element.
Life Form: T.
IUCN Risc category: Lc.

Gypsophila confertifolia Hub.-Mor.:
M.K. 16 (GUL 13724/42-1**!**).
Economic importance: Unknown.
Fl.: 5-6, **Fr.:** 6.
Habitat: Pinus forests and opens, stream beds, macchie, up to 1500 m.
Life Form: T.
Geographical Distribution: Endemic, Rare, W. Anatolia. Mediterranean element.
IUCN Risc category: Cd.

Gypsophila hispida Boiss.
Tunceli: From Ovacık to Tunceli, 26. km to Tunceli (39º17'111''E, 39º25'372''N), roadsides, 1080 m, 28.vii.2011, Özgökçe 13840 (VANF**!)**.
Economic importance: Unknown.
Fl.: 6-7, **Fr.:** 7.
Habitat: On limestone rocks, slopes, roadsides, 1000-2000 (-2200) m.
Geographical Distribution: Nonendemic, Anatolia in Türkiye, Transcaucasia. Irano-Turanian element.
Life Form: Ch.
IUCN Risc category: Cd.

Gypsophila munzurensis Armağan:
Economic importance: Unknown.
Fl.: 6-7, **Fr.:** 7.
Habitat: Fields of oak forest and slopes, 100-1100 m.
Geographical Distribution: Endemic, Irano-Turanian element.
Life Form: T.
IUCN Risc category: CR.

Gypsophila pilosa Hudson:
Sivas: Gürün-Darende highway, 1310 m, 14.viii.2006, A. Özçelik 104 (GUL 13/24/44-1**!**).
Isparta: Above Ayazma picnic areas, slopes of Davras Dağı, open coniferous woods, 1400 m, 6.viii.1994, Özçelik 6770 (GUL……!).
Afyonkarahisar: Ankara-Afyonkarahisar highway, 100 km to Afyonkarahisar, gibsous areas, 860-900 m, 7.vii.2010, Özçelik 12877(GUL 13/24/44-05**!**). Özçelik & Muca 05((GUL 13/24/44-2**!**); Özçelik & Muca 04((GUL 13/24/44-3**!**); Özçelik & Muca 12((GUL 13/24/44-4**!**); M.K. 704 (GUL 13/24/44-06**!**).
Economic importance: Unknown.
Fl.: 5-8, **Fr.:** 7-8.
Habitat: Fields, fieldsides, roadsides, steppe, 300-1200 m.
Geographical Distribution: Nonendemic, Irano-Turanian element. This species is a weed that grows abundantly in fields and on edges of fields in the Lakes Region, Central and South Anatolia regions. It is very polymorphic.
Life Form: T.
IUCN Risc category: Lc.

Gypsophila pulvinaris Rech. fil.:
Ağrı: Doğubeyazıt, above Ishak Pasha Palace, near Ahmedi Hani HZ tomb, steppe, 1950 m, 18 viii 1995, Özgökçe 3170-3175 (in VANF**!**).
Economic importance: Unknown.
Fl.: 8**, Fr.:** 8-9.
Habitat: Steppe, c. 1900 m**.**
Geographical Distribution: Nonendemic, rare in Türkiye (Ağrı), Iran, Transcaucasia. Irano-Turanian element.
Life Form: T.
IUCN Risc category: VU.

Gypsophila paniculata L. var. ***paniculata:***

Real Market, culture form, M. İnan 03 (GUL 13/24/13-2); **Isparta:** Centrum, 2023; S. Y. Keleş (GUL 13/24/13-3): This variety is logged first time in Türkiye. It is known as annual and cultured form in Türkiye and as a white-pink flowered ornamental plant in World. It is used as an arrangement in art of vase decoration in floristry and produced in Europe and Türkiye. In Türkiye, two cultivars of this taxon are produced for floriculture and placed as an arrangement among flower bouquets. The most widely produced and recognized 'Perfecta' and 'Snowflake' cultivars in the country. Its origin is unclear. Its wild form is unknown There may be no natural spread of species in the world.

Economic importance: It is a very important in floriculture. A few varieties of this species are produced in Thrace and Antalya-Mersin etc. for floriculture purposes**.** Cultivars such as 'Tall Baby's-breath Perfecta, Traeca' are used by florists in the country. Cultivars uni and multylayered; with white and pink flowers are found in Türkiye. Drying for it is an important process. It is not economical to use as a live flower. They can be painted different colors.

Fl. 6-8. **Fr.** 7-8

Habitat: In vulcanic steppes, along edges of pine forests and on sandy and calcareous hills.

Geographical Distribution: Nonendemic; Türkiye, Austria, Czechoslovakia, Sweden, Hungary, Yugoslavia, Romania, Bulgaria, Central East and Russia, Türkiye, Ukrainia, Iran, Caucasus, West Siberia, Middle Asia, Mongolia, West China. Cosmopolitan.

It is also found in West Europe and North America as an cultured species or a garden escape.

Life Form: T.

IUCN Risc category: Lc.

Gypsophila paniculata L. var. ***araratica*** Hub.-Mor.:

Iğdır: Küçük Ağrıdağı, around Sultantop, gravelly pastures, about 2200-2400 m, 15.vii.1990, Özçelik 2591(GUL 13/24/13-3!); ATA 1654!); Büyük Ağrıdağı, Kilise locality, 39^{o} 47' 39.02'' N 44^{o} 14' 42.09'' E, 1950 m, 08.viii.2014, Özgökçe 11140 (VANF**!**). **Ağrı:** W slope of Büyük Ağrıdağı, steppe, about 2500 m, 15 vii 1990, Demiriz 3338 (in Hb. EGE**!**).

Economic importance: Unknown. There are cultivars grown for floriculture purposes.

Fl.: 7-8, **Fr.:** 8-9.

Habitat: Saline soils, salty steppe, slopes, cultivated lands and roads, (1550-)1950-2500 m.

Geographical Distribution: Endemic. Irano-Turanian element. It grows in high altitude areas on the Kars province, especially on Ağrı dağı.

Life Form: Ch.

IUCN Risc category: EN. Fig. 28-b.

CONCLUSION

Genus *Gypsophila* with approximately 150 species represents fourth largest genus of Caryophyllaceae and second genus of the family in Türkiye. Iran is second main center of *Gypsophila* diversity with 38 species in the world. Türkiye has not been sufficiently studied yet. Especially if the Eastern regions are examined well, new species are found and the number of species in the genus exceeds 70 in Türkiye. In today, there is 65 taxa from 58 species of *Gypsophila* in Türkiye. 32 taxa of these plants are endemic to Türkiye. 43 taxa from 58 species in Irano Turanian region. Therefore, the 1st center of differentiation is Türkiye. Based on our 25-year field observations, gene center of the genus, estimated as the Irano-Turanian, and also 5 regions were estimated as differentiation centers and migration routes. There is a diffusion from Eastern Anatolia towards the Lakes Region. Adherence to rock is high, and adherence to moisture and water is poor. Considering *Gypsophila* as one of most polymorphic genus of the family. Almost half of its taxa is endemic. *Gypsophila* is mainly a typical genus of steppe vegetation. It grows in habits of Irano-Turanian phytogeography region in Türkiye. The region is characterized by a very low amount of precipitation restricted to winter and summer months, and by a long dry season. The summer is cool and dry; winter very cold, with a temperature contrast between day and night which is typical for a semi-desert. There are no forests of the region in general. Most plants of the genus in Türkiye are either therophyts and chamaephytes life forms. Majority of *Gypsophila* species is in habit of dry slopes at middle or high elevations (1000-2500 m). It is preferred calcareous and gypsous soils in general. Some species like to grow on bare calcareous, volcanic rock or in crevices of the

latter. In Türkiye, there are 7 political regions. Of these, Central Anatolia, East Anatolia and Southeast Anatolia regions belong to the Iran-Turan phytogeographic region. More than half of the 65 taxa (Özçelik and Özgökçe, 2020) in Türkiye of genus *Gypsophila* shows the spread in the Eastern Anatolia. Majority of endemic taxa of this genus is Irano-Turanian element. The Eastern Anatolia region is covered with higher altitude mountains than other regions. Height of plateaus in the region is over 1700 m, average in 1900 m. Mountainous areas of the region are richer in endemic. Especially Anatolian Diagonal and its surroundings are richer in terms of endemics. *Gypsophila* is at head of rich genera in endemics. From west to east; as the transition from plateaus and seaside to the orogenic belt, number of endemism and taxon number increases in *Gypsophila*.

Nonendemic taxa: 19, Nonendemic rare taxon 1(*G. laricina.* The native range of it is Central and Eastern Anatolia regions of Türkiye and NW. Iran).

Endemic taxa: 32; as relict endemic taxon 1 (*G. davisii* in Muğla prov.), regional endemics: 11 (*G. adenophylla, G. graminifolia (*Endemic for Van Lake Basin), *G. guvengorkii* (Karabük), *G. olympica* (Endemic for Bursa), *G. arrostii* var. *nebulosa* (Endemic for Lake Region), *G. perfoliata* var. *araratica* (Endemic for Ağrı), *G. venusta* subsp. *staminea (*Endemic for Erzurum), *G. simonii (*Endemic for Sivas and Çankırı), *G. tuberculosa (*Endemic for Erzincan and Erzurum), *G. heteropoda* subsp. *minutiflora* (Endemic for Sivas)

Rare endemics: *G. confertifolia* (in Muğla), *G. munzurensis* (in Tunceli), *G. paniculata* var. *araratica* (in Ağrı) and other endemics: 20 taxa (Table 1).

Table 1: Observations on some G*ypsophila* taxa of Türkiye

Vertical distribution	**Min.-Max. altitudes**	**0-500 m**	**500-1000 m**	**1000-1500 m**	**1500-2000 m**	**2000-2500 m**	**2500-3000 m**	**3000-3500 m**	**3500-4000 m**
	100-3400 m	10 taxa (% 9,4)	21 taxa (% 19,81)	26 taxa (% 24,52)	24 taxa (% 22,64)	17 taxa (% 16,03)	7 taxa (% 6,60)	1 taxon (% 0,94)	-
IUCN Threatened Cathegories	**Lc** (Least concern)	**CR** (Critically endange-red)	**VU** (Vulnerable)	**Cd** (Conservation dependent)	**EN** (Endange-red)	**NT:** (Near threa-tened)	**EW** (Extinct)	**DD** (Data deficient)	**NE** (Not evaluted)
	19 taxa (% 37,25)	10 taxa (% 19,60)	9 taxa (% 17,64)	8 taxa (% 15,68	4 taxa (% 7,84)	1 taxon (% 1,96)	-	-	-
Habitat preferings	**Steppe and slopes**	**Rocky places/ crevices**	**Gibsous rocky places**	**Alpinic pastures, meadows**	**Fields and roadsides**	**Sandy, saline soils**	**Macchie**	**Forest and opens**	**Stream bads**
	40 taxa (% 48,80)	18 taxa (% 14,75)	14 taxa (% 11,47)	10 taxa (% 8,19)	16 taxa (%13,11)	9 taxa (%7,37)	4 taxa (%3,27)	6 taxa (%4,91)	5 taxa (% 4,09)
Flowering mounts	**April**	**May**	**June**	**July**	**August**	**Septem-ber**	**Octo-ber**	**November**	**December**
	2 taxa	17 taxa	38 taxa	40 taxa	23 taxa	1 taxon	-	-	-
Fruiting mounts	**April**	**May**	**June**	**July**	**August**	**Septem-ber**	**October**	**November**	**December**
	-	1 taxon (% 0,86)	12 taxa (% 10,34)	46 taxa (% 39,65)	42 taxa (% 36,20)	13 taxa (% 11,20)	2 taxa ((% 0,17)	-	-
Phyto-geographical region elements	**Total taxa**	**Endemic**	**Non-endemic**	**Irano-Turanian**	**Saharo arabian**	**Mediter-ranean**	**Euro-Siberian**	**Euxine**	**Cosmo-p olitan**
	47 spp. **51** taxa	**32** taxa (% 62,74)	**19** taxa (% 37,25)	**36** taxa (% 70,58)	**1** taxon (% 0,19)	**7** taxa (% 13,72)	**4** taxa (% 7,84)	**2** taxa (% 3,92)	**1** taxon (%0,19)

Gypsophila species constitute one of the important elements in flora of East Anatolia, which until recently have not been studied well, except for floristic and chemical studies. Taxonomical and geographical distributional data are unsatisfactory for Türkiye. For floristic studies, few collections (of which some are new species or records) have been made from some mountains in the region (Barrera and Arenas, 1999; Koç, 2013, Armağan, 2016; Armağan et all., 2017; Muca, 2017). General literatures (Rechinger, 1988; Kandemir and Türkmen, 2008; Özçelik and Yıldırım, 2011; Özdemir et all., 2010) which are still available are those primarily meant general systematic and taxonomy. For most of the plants described appears to us as invalid. In view of this, we have started investigation on the genus based on personal observations and wider collections on population basis. While visiting the area, we came to conclusion that the region between Ağrı and Van, Bitlis, Hakkari provinces especially Tahir, Tendürek, Kavuşşahap, Alacabük, Çadır(Artos), Başet, Süphan, Nemrut, Erek and Ağrıdağı, Sat and Cilo dağı, Başkale environs (ie. Van Lake Basin and its environs) appear to us as center of great diversity of the genus. Mojority of these mointains is Lake Van Basin. The mountains and their environs are rich in ***G. graminifolia, G. paniculata, G. perfoliata, G. bicolor, G. bitlisensis*** and ***G. elegans, G. ruscifolia, G. venusta*** subsp. ***staminea, G. munzurensis.*** The area must therefore be investigated in detail.

Some widespread species, e.g. *G. paniculata, G. pilosa, G. viscosa, G. aucheri, G. sphaerocephala, G. bitlisensis, G. elegans, G. ruscifolia, G. venusta, G. simulatrix* and *G. arrostii* were represented by very many collections. *G. olympica, G. guvengorkii, G. pulvinaris, G. hispida, G. confertifolia, G. muralis, G. antarii, G. pallida, G. libanotica, G. oblanceolata, G. simonii, G. lepidioides, G. leucochleana, G. osmangaziensis, G. syriaca* and *G. brachypetala* are represented with very few specimens.

Some species like *G. graminifolia* grow on serpentine rocks (Barkoudah, 1962). *G. perfoliata*, *G. curvifolia*, *G. guvengorkii* grow on sandy soils and prefer low and moist parts. *G. confertifolia*, *G. tubulosa* grow in maquis vegetation of Mediterranean phytogeographical region. *G. pilosa, G. muralis* and *G. antari, G. bicolor, G. arrostii* grow in cultivated fields. *G. pilosa, G. muralis* may be accepted as weeds.

Almost all examined species in this study are either endemic to Türkiye or rare. The term 'rare' is used by us for those plants which have been collected from only one, two or rarely three localities. Our present level of knowledge on *Gypsophila* species comes mainly from the lists of rare species by Ekim et al. (2000). Forests, their opens, slopes, volcanic places, saline soils, pastures, marshes, wet and dry plains, abandoned cultural areas, river banks, lakes and lake shores etc. from sea level to 700-3000 m contribute to the formation of rich flora of Türkiye. Only *G. curvifolia* and *G. oblanceolata* love the meadow and swampy environments (Davis, 1967). Soaproot (Radix Gypsophilae) is an important drug having medicinal and food in economic importance. They have been collected from natüre for more than 50 years for industrial purposing (Koyuncu et al., 2008). In Konya, soapwort (Çöven) was planted in the fields to rehabilitate degraded lands. A few years later, the fields were reclaimed and brought back into agriculture (Babaoğlu and Gezgin). Although soapwort extract is a very valuable raw material, its usage areas are not yet fully understood. It must be research for economic purposings.

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