

## Soaproot Yielding Plants of East Anatolia and Their Potential in Nature

Mehmet KOYUNCU, Ceyda Sibel KILIÇ\*, Ayşegül GÜVENÇ

Ankara University, Faculty of Pharmacy, Department of Pharmaceutical Botany, 06100 Tandoğan, Ankara - TURKEY

Received: 14.10.2008

Accepted: 07.11.2008

**Abstract:** Soaproot (*Radix Gypsophylae*) is an important herbal drug having medicinal and economic importance and has been collected from nature for more than 30 years. The main goal of this study was to determine soaproot yielding plant species in East Anatolia, and their potential in nature. Collected plants were determined by field studies; damage to the environment after collection was observed, and commerce, exportation, domestic utilisation of soaproot, and problems and proposed solutions were examined. Soaproot is presently obtained from a total of 7 plant species belonging to 2 genera in Turkey (6 *Gypsophila* L., 1 *Ankryopetalum* Fenzl): *G. graminifolia* Bark., *G. arrostii* Guss. var. *nebulosa* (Boiss. & Heldr.) Bark., *G. eriocalyx* Boiss., *G. bicolor* (Freyn & Sint.) Grossh., *G. perfoliata* L., *G. venusta* Fenzl, and *Ankryopetalum gypsophilooides* Fenzl. It is determined for the first time that *G. graminifolia* is also being collected as soaproot from Van province.

**Key Words:** Soaproot, *Gypsophila*, *Ankryopetalum*

### Doğu Anadolu'da Çöven Elde Edilen Bitkiler ve Bunların Doğadaki Potansiyeli

**Özet:** Bu çalışma yaklaşık 30 yılı aşkın bir süreden beri doğal floramızdan sökülerek yurt içinde kullanılan veya ihraç edilen, tıbbi ve ekonomik yönden önemli bir drog olan "çöven kökü" (*Radix Gypsophylae*)'nün elde edildiği türler üzerinde yapılmıştır. Çalışmanın asıl amacı Doğu Anadolu'da çöven elde edilen bitkiler ve bunların doğadaki potansiyellerinin araştırılmasıdır. Bu amaçla kökleri sökülen bitkiler arazi çalışmaları ile tespit edilmiş, söküldükleri doğal alanlar incelenmiş, söküm sonucu meydana gelen tahribatlar gözlenmiş, çöven ticareti, ihracatı, çövenin yurt içinde kullanılışları, sorunlar ve çözüm önerileri üzerinde durulmuştur. Sonuçta çöven köklerinin özellikle Doğu ve Güneydoğu Anadolu bölgelerinden söküldüğü anlaşılmıştır. Çöven yurdumuzda 2 cinse ait 7 türden elde edilmekte olup, (6 *Gypsophila* L., 1 *Ankryopetalum* Fenzl), sökülen *Gypsophila* türlerinin üçü endemik, diğer üç tür de yurdumuzda dar yayılışlı bitkilerdir. *G. graminifolia* Bark.'nın çöven olarak kullanılmak amacıyla Van, Başkale çevresinden söküldüğü ilk defa bu çalışma ile tespit edilmiştir.

**Anahtar Sözcükler:** Çöven, *Gypsophila*, *Ankryopetalum*

### Introduction

The Anatolian Peninsula is a region that remained in at least some parts as land in every geological period. Therefore, it bears plants belonging to every geological period, and provides them an environment to live and, as a consequence, Anatolia is rich in biological resources with more than 10,000 flowering plants. Turkey's being an intersection point for 3 important phytogeographical regions (Irano-Turanian, Mediterranean, and Euro-Siberian) also contributes to this floral richness. More than 300 plants, each having different regional names, are used traditionally for different purposes and are being

exported. Among these and probably among the most important ones are the plants known with the common name soaproot. Roots (*Radix Gypsophylae*) have been collected from nature, especially in East and Central Anatolia, and used domestically or exported abroad for more than 30 years (Özhatay et al., 1997).

In general, soaproot is the woody roots of some perennial species of the genera *Gypsophila* L., *Saponaria* L., and *Ankryopetalum* Fenzl, belonging to the family Caryophyllaceae. However, *Saponaria* is not used as soaproot in Turkey; it is presently obtained from a total of 7 plant species belonging to 2 genera (6 *Gypsophila* L.,

\* E-mail: C.Sibel.Erdurak@pharmacy.ankara.edu.tr

1 *Ankyropetalum* Fenzl) in Turkey: *G. graminifolia* Bark., *G. arrostii* Guss. var. *nebulosa* (Boiss. & Heldr.) Bark., *G. ericalyx* Boiss., *G. bicolor* (Frey & Sint.) Grossh., *G. perfoliata* L., *G. venusta* Fenzl, and *Ankyropetalum gypsophiloides* Fenzl.

Soaproot is sometimes mixed with roots of other plants and sold as soaproot of lower quality. Mostly *Astragalus* L. roots and to a lesser extent *Glycyrrhiza glabra* L., *Acantholimon* Boiss. sp., *Onobrychys cornuta* L., and *Scorzonera rigida* Aucher roots are used for this adulteration. Although the morphological properties of these roots are alike, they do not contain saponins, and so cannot be used instead.

On the other hand, *Gypsophila* and *Ankyropetalum* species are rich in saponins, and approximately 1000 t of fresh roots are collected annually. Half of this quantity is collected in Van province in East Anatolia, and the other half is collected in Central and South-West Anatolia. Half of this quantity is used domestically and the remainder is exported (Özhatay, 1997). Although our study confirmed this information, it is well known that soaproot collection has decreased greatly in Turkey since 2002. During the interviews we carried out with soaproot trading companies, we learned that a cheaper soaproot of better quality was imported from foreign countries, especially from Afghanistan.

Although economically important, these plants are a source of biological richness in Turkey. Most of them are endemic species having narrow distributions. Since they are not cultivated but collected directly from nature, populations of these plants in nature deteriorate, their generations diminish or become extinct, and the balance of nature is disturbed. Since only roots and not the aerial parts are collected destruction is an even more important problem.

## Materials and Methods

In the course of the study, soaproot yielding plants, and their distributions, populations, collection times, and localities were determined. Companies dealing with soaproot collection and trade were determined and interviewed. Collection localities were visited and observations were made. Voucher specimens are deposited in Yüzüncü Yıl Üniversitesi Fen-Edebiyat Fakültesi Herbariyumu (VANF).

Collection of the roots somewhat differs according to the species. For example, *G. bicolor* grows mainly in arable fields; soils of these fields are sandy and the thick roots of the plants go down 50-100 cm deep. Roots are collected by drilling holes in the ground 80-100 cm in diameter and 50-100 cm deep. These roots are divided into pieces 10-30 cm long and then dried. On the other hand, *G. graminifolia*'s habitat is mountain steppe; therefore its roots are shorter and branched.

## Results

The name *Gypsophila* comes from *gypsos* (gypsum) and *phileo* (to love, loving), indicating plants loving soil with gypsum, growing in soil with gypsum. *Gypsophila* species are mainly present in the northern hemisphere, in temperate regions of Asia and Europe. One hundred and twenty-six species of this genus can be found throughout the world and 55 species grow in Turkey (Huber-Morath, 1967a; Davis et al., 1988; Ataşlar, 2000, 2005). The gene centre of the genus is an area covering Turkey, Caucasia, Northern Iraq, and Northern Iran. Seventy-five species out of the 126 grow within this area and 49 of them are reported to be endemic (Ataşlar, 2005; Koyuncu et al., 2006).

Species yielding soaproot and their locations within the study field are as follows:

1. *G. bicolor* (Frey & Sint.) Grossh. (Turkish names: Van çöveni, tarla çöveni)

This species is distributed around Van and Artvin provinces. However, it is more widespread around Van and soaproot is obtained there. Therefore, roots of this species are known as "Van çöveni" or "soaproot of 1<sup>st</sup> quality".

"Van çöveni" is generally roots that are 5-30 cm long, with a diameter of 1-5 cm, cylindrical, straight or somewhat twisted, with lengthwise grooves, off-white or yellowish white. The roots are hard and difficult to break. Its powder causes sneezing. Saponin content is 20%-25% (Sezik, 1982). This value is higher than that in other soaproot yielding plants. This is the most preferred soaproot, also known as the soaproot of the highest quality. However, this species has a narrow distribution. It mainly grows in steppe habitats or in arable and empty fields around Van and its districts. It has been collected for nearly 30 years, especially from Özalp, Saray,

Muradiye, Çaldıran, Erciş, Erçek, Gürpınar, Gevaş, Hoşap (Güzelsu), and Başkale districts and villages around Van Lake. Soaproot collection begins in this region while plants are beginning to shoot and continues till the end of June. Villagers usually collect and cut the roots along with their children (Figure 1). Sometimes a part of the roots or adventitious roots breaks and remains underground. During our observations we determined that these parts can produce shoots for the plant to grow back from in the coming year. However, it takes a couple of years for this plant to mature again. It is difficult to approach these soaproot collectors to talk; they tend to run away from you. The reason for this is simple: they do not fill in the holes that they dig in the ground, and when farmers come to plough the field the tractors' tyres get stuck; consequently it is difficult to plough the land. Therefore, farmers angrily chase after the collectors. We had a hard time convincing the collectors that we were not farmers but just researchers.

Soaproot, collected in early spring, is kept at the villages until the representatives of purchasers come to the villages around the second half of May. They buy the roots for purchasers coming from İstanbul, İzmir, or Konya. These soaproots contain dust and soil to some extent. Therefore, roots unloaded from the trucks are spread out on a flat surface and cleaned, then cut into parts and dried. After that, they are packed in sacks and delivered to the headquarters of the purchasers (Figures 2-5).

2. *G. arrostii* Guss. var. *nebulosa* (Boiss. et Heldr.)  
Bark. (Turkish name: Beyşehir çöveni)

This species is endemic in Turkey. Its roots are collected around Beyşehir in Konya province, and Isparta.



Figure 1. Boys cutting soaproot into pieces.

Crude saponin content is 19%-22% (Sezik, 1982). This is also considered to be of good quality; however, this species also has a narrow distribution. While halvah makers in Konya especially use this soaproot, its quantity meets only a small portion of the demand. Due to modern



Figure 2. Soaproot transferred to vendors by truck.



Figure 3. Soaproot being unloaded from a truck.



Figure 4. Soaproot, spread on a flat surface for drying.





Figure 5. Soaproot during the drying process.

agricultural tools and excess collection, the population of this species has diminished.

3. *G. ericalyx* Boiss. (Turkish name: Çorum-Yozgat çöveni)

Grows around Ankara, Çankırı, Çorum, Eskişehir, Kayseri, Sivas, and Yozgat provinces in steppe habitats with gypsum. This is an endemic species. It is sold as Çorum-Yozgat çöveni but is not popular. Therefore, it was not collected in great quantities and currently is not being collected.

4. *G. perfoliata* L. (Turkish name: Niğde çöveni)

Grows around Ankara, Kayseri, Sivas, Erzincan, Konya, Niğde, and Denizli provinces. It is considered to be of 3<sup>rd</sup> quality and therefore is not used as soaproot.

5. *G. venusta* Fenzl (Turkish name: Konya çöveni)

Grows around Ankara, Çankırı, Konya, Gaziantep, Urfa, Sivas, Malatya, and Erzurum provinces in steppe habitats or arable fields, and is reported to yield soaproot (Baytop, 1984). Halvah makers in Konya stated that soaproot delivered to them was a mixture of more than one species. We identified that these roots belonged to *G. arrostii*, *G. perfoliata*, and *G. venusta*.

6. *G. graminifolia* Bark. (Turkish name: Başkale çöveni, Dağ çöveni)

This local endemic species also grows in Van province, around Başkale, in mountain steppe and serpentine slopes and also has a narrow distribution. This species cannot meet the demand for Van çöveni; therefore it is collected both in spring (May-June) and in autumn (September-October). This species also grows between Başkale and the Iranian border; however, this region is mountainous

and it is not very safe to conduct research. Nevertheless, we used every means to visit almost the entire region and determined soaproot collecting villages. According to our observations, the species' population is not very big and is significantly disturbed due to intensive collection. However, collection of the plants decreased beginning from 2002 due to the small population of the plant and decreased demand. However, between 1995 and 2001, 200 t of "dağ çöveni" were collected from this region per year and therefore natural habitats of the species were destroyed.

Another soaproot yielding genus in Turkey is *Ankyropetalum* Fenzl. Three species of this genus grow naturally in Turkey; all of them are endemic. However, only *A. gypsophilloides* Fenzl roots are known, with the name "helva (halvah) root" around Siirt province and used as soaproot.

*A. gypsophilloides* Fenzl (Turkish name: Siirt çöveni, Helvacı çöveni, helva kökü)

This species grows around Mardin, Gaziantep (Huber-Morath, 1967b), Batman, and Siirt provinces. Its roots are collected in Siirt and used by local halvah producers. However, most of these halvah producers have closed down recently and only a few are left, and these remaining halvah producers quitted using soaproot and started using soaproot juice delivered from İstanbul in a ready to use form. Therefore, soaproot has not been collected in these regions for a couple of years, whereas 30-40 years ago roots of these plants were collected and sent outside Siirt as well. Due to previous intensive collection, its population decreased in this region, and since this species grows near cultivated areas and field borders, they are also negatively affected by the expansion of fields.

When we discussed the situation with the representatives of trading companies (Kalealtı Ticaret şirketi, İstanbul, Gesaş Genel Gıda Sanayi ve Ticaret A.Ş., Konya, İstanbul Tarım Ürünleri Limited Şirketi, İstanbul etc.), we were told that cheaper soaproot having better quality is being imported from Afghanistan, and so there is no need to collect soaproot in Turkey anymore. We also learned that imported soaproots were re-exported after the extraction of their juices. This soaproot juice (extract) is sold to halvah producers in Turkey.

During our observations, we found out that population of "Siirt çöveni" was severely damaged due to intensive collection.

Soaproot exports started in 1972. Exported quantities can be seen in Figures 6 and 7. According to the State Institute of Statistics data, Germany, Greece, Romania, Tunisia, Egypt, Libya, Sudan, Israel, Saudi Arabia, France, Belgium, Luxemburg, Malta, USA, Australia, Kuwait, Sweden, Norway, the Netherlands, United Kingdom, Turkish Republic of Northern Cyprus, Japan, Poland, Bulgaria, Azerbaijan, Russia, Morocco, Bosnia-Herzegovina, Algeria, Albania, and Ukraine are the countries exported to. However, this exportation is not regular; the countries and quantities vary by year (DİE, 1982-2006).

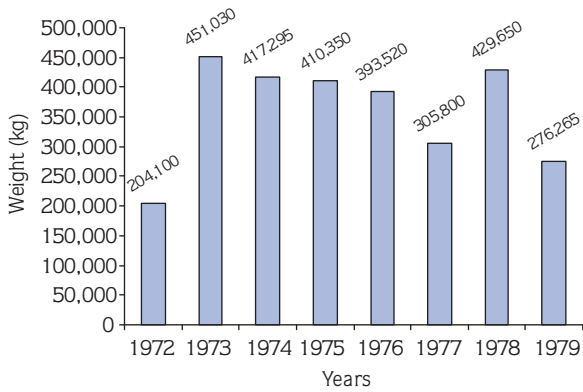


Figure 6. Soaproot exports of Turkey. Sezik, 1982.

However, these data cannot be accurate since the State Institute of Statistics did not and still does not keep records of exported plants according to their names; they group many different plant species together and so actual export quantities could be greater. Therefore, during our study, we tried to determine the annual average quantity

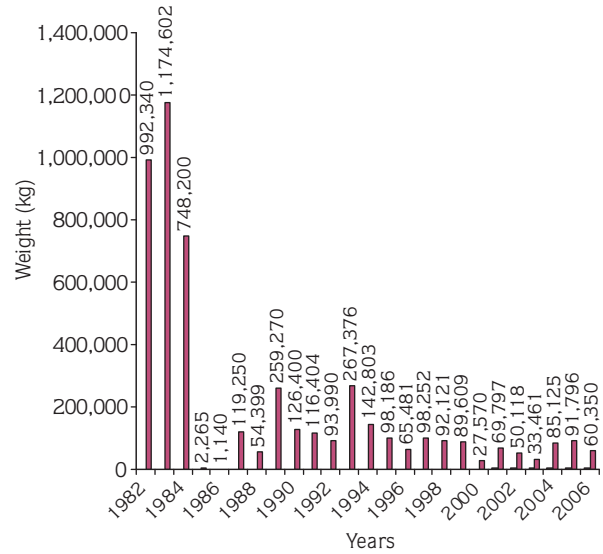


Figure 7. Soaproot exports of Turkey. According to the annual foreign trade statistics of the State Institute of Statistics

of collected and exported soaproots. The quantities are given as fresh roots; when dried, these values are reduced by half (see Table 1).

Soaproot has been collected in extensive quantities for years due to the ease of collection, high unemployment rate in the region, and the demand, especially for Van çöveni. Ploughing the fields with tractors instead of ploughs also increases the damage. In order to preserve these species and also have regular exports, feasibility studies should be conducted and a determined quantity of a given quality should be cultivated. Soaproot should not only be collected from nature and sold when a buyer is present; its cultivation should be scheduled. Decrease in collection due to decreasing demand and soaproot

Table 1. Collected and exported roots.

Species	Quantity in Tonnes/Year (Fresh)		
	Collected	Domestically Used	Exported
<i>G. bicolor</i>	500	250	250
<i>G. graminifolia</i>	200	100	100
<i>G. venusta</i>	100	60	40
<i>G. arrostii</i> var. <i>nebulosa</i>	100	50	50
<i>G. eriocalyx</i>	50	50	-
<i>G. perfoliata</i>	40	40	-
<i>A. gypsophilloides</i>	10	10	-
Total	1000	560	440

imports from Afghanistan is good news for our flora for now, but since domestic soaproot usage does not decrease, we think that collection may start again if soaproot imports are interrupted. Therefore, regarding our observations, we conclude our study with the following recommendations:

- Soaproot collection in Turkey should be stopped or at least alternation should be applied to collection areas.
- Cultivation of soaproot yielding plants, especially *G. bicolour*, should be studied and encouraged.
- Feasibility studies for the soaproot market should be performed and each year soaproot having the same quality should be introduced into the market.

- Standardised extract of soaproot should be prepared.
- Soaproot yielding other perennial species and their saponin contents should be determined and new soaproot resources should be identified, and their cultivation and marketing possibilities should be studied.
- We must inform our citizens about plants' being our biological richness and gene resources and that they should be preserved.
- Soaproot imports may stop some day, but soaproot usage will continue and so we should take necessary precautions without delay.

## References

- Ataşlar E (2000). *Gypsophila* L. In: Güner, A. (ed.), *Flora of Turkey and the East Aegean Islands Vol. 11*, pp. 49. Edinburgh: Edinburgh University Press.
- Ataşlar E (2005). *Gypsophila osmangaziensis*: (Caryophyllaceae), a new species from Central Anatolia, Turkey *Ann Bot Fennici* 42: 57-60.
- Baytop T (1984). *Türkiye'de Bitkilerle Tedavi*. İstanbul Üniversitesi yayınları, No. 3255.
- Davis PH, Mill RR & Tan K (ed.) (1988). *Gypsophila* L. In: *Flora of Turkey and the East Aegean Islands Vol. 10*, pp. 73-75. Edinburgh: Edinburgh University Press.
- Devlet İstatistik Enstitüsü (State Institute of Statistics) (1982-2006). Foreign trade annual statistics, Ankara.
- Huber-Morath A (1967a). *Gypsophila* L. In: Davis PH (ed.), *Flora of Turkey and the East Aegean Islands Vol. 2*, pp. 149-171. Edinburgh: Edinburgh University Press.
- Huber-Morath A (1967b) *Ankyropetalum* Fenzl In: Davis PH (ed.), *Flora of Turkey and the East Aegean Islands Vol. 2*, pp. 147-148. Edinburgh: Edinburgh University Press
- Koyuncu M, Güvenç A & Erdurak CS (2006). Doğu Anadolu'da Çöven Elde Edilen Bitkiler ve Bunların Doğadaki Potansiyeli, TBAG-DPT.Ç.Sek.6 (199 T 064).
- Özhatay N, Koyuncu M, Atay S & Byfield A (1997). Türkiye'nin doğal tıbbi bitkilerinin ticareti hakkında bir çalışma (A study on the trade of Turkish medicinal plants), Doğal Hayatı Koruma Derneği, İstanbul.
- Sezik E (1982). The Origin and the Quality of the Turkish Soaproots. *J Fac Pharm Ankara* 12: 41.