



An ethnobotanical field study; traditional foods production and medicinal utilization of *Gundelia* L. species in Tunceli (Turkey)

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This article gives important ethnobotanical information about *Gundelia* L. (Kenger) in Tunceli (Eastern Anatolia Region-Turkey). Traditional use of three newly discovered species of Kenger (*G. vitekii*, *G. dersim*, *G. munzuriensis*) in and around Tunceli, as well as *Gundelia glabra* Miller, has been investigated. A field study had been carried out for a period of approximately two years (2015–2016). During this period, 27 *Gundelia* L. species were collected. Nine different traditional uses of Kenger plant as food were recorded. Local people use Kenger plant as egg meal with olive oil, watery food with rice, food with garlic yogurt, salad, pickle, gum, coffee, snack and animal feed. Since the plants are newly discovered, the first literature records have been made by us.

Keywords: Ethnobotany, Food plants, *Gundelia*, Medicinal plants, Traditional uses

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Traditional information of plants and their specialities have constantly been transferred among generations via the natural progress of daily life. Nevertheless, the maintenance of this information is vanished during transmission between the generations is not assured any more¹. Over the last years, several ethnographic studies have been published on food and the nutrition about Turkey focused on local folklore studies and document collections etc²⁻⁵.

Numerous earlier reports have described the traditional knowledge of the taxa, their usage areas and different applications in pharmacy, local markets and more⁶⁻⁸.

Over 3000 endemic plant species grow in Turkey and has high diversity of other plants, and is nearly completely covered by 30% world's 34 biodiversity hotspots⁹.

In Tunceli, recent studies on kenger have also been increased and three new kenger species have recently been recorded. These species are *G. munzuriensis*, *G. dersim* Vitek Yüce & Ergin, and *G. vitekii* Armagan¹⁰⁻¹².

This study was carried out with the aim of recording the traditional uses of 4 *Gundelia* L. (Kenger) plant (*G. munzuriensis*, *G. dersim*, *G. vitekii* and *G. glabra*), which naturally spread in Tunceli, as

food. This research was also designed with the aim of examining the dietary value of food plants via comparing the knowledge obtained in ethno-botany studies, and investigating the safety of the use of these plants.

Material and Methods

Research area

Research area was located on the in the Eastern-Anatolia in Turkey (Fig. 1)¹³. Tunceli (+39° 2' 37.27", +39° 30' 51.78") belongs to the Iran Turan Plant-Geography Region and falls within the B/7 Grid-square¹⁴.

There were little floristic studies in the field of research. A total of 1523 plant species were determined in Munzur Mountains, Tunceli and the surrounding areas. Among these, 46 species are endemic to Munzur Mountains and 229 species are endemic to Turkey^{10,12-18}.

A total of 113 geophytes (bulbous, tuberous and rhizome) were identified in the study conducted between 2012 and 2015, of which 14 are endemic and 6 are rare¹⁹.

Plant collection

Field work was carried out over a period of approximately two years (March 2015 and November 2016). During this period, 27 *Gundelia* L. specimens

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were collected. The plants taxa were pressed in the field and prepared for identification and were compared with the specimens in Munzur University Herbarium. The locations of collection for the specimens examined are given in Table 1. All of the photos were taken by the author.

Information about plants

For long time the genus *Gundelia* L. was assumed to be monospecific, additionally described taxa systematically synonymised under *Gundelia tournefortii* L.^{20,21}.

Gundelia glabra Miller is an easily recognizable species (Fig. 2). It can be distinguished from *Gundelia tournefortii* by the brownish flowers (versus yellowish to yellow flowers) and being nearly glabrous (versus dense indumentum)^{22,23}.

As compared to *Gundelia dersim*, *G. glabra* can easily be identified being a small plant with few branches, being completely (or nearly) glabrous, growing in dryish habitats (meadows or gravel). Young synflorescences are protected by densely imbricate bracts¹¹.

The newly discovered species *Gundelia vitekii* Armağan forms sparse populations of scattered plants in dry to very dry habitats (Fig. 2). It does not form populations as dense as *Gundelia dersim* or *G. munzuriensis* (Fig. 2)¹⁰. This can be explained by the difficulties for each plant to establish itself in these habitats. Until now *Gundelia vitekii* has been endemic to the northern part of Tunceli province.

Interviews with native people

We administered a questionnaire to the native people through face to face interviews (Appendix - A) (1) What is the vernacular name of the plant used? (2) Which parts (Flower, whole plant, leaves, root, etc.) of the plants do you use? (3) How do you prepare the plants for use? (4) How and when do you use the plants? etc.).

We paid a salary to the visitors for providing their knowledge about Kenger (*Gundelia* L.) for the

purpose of obtaining detailed information. During the interviews, demographic structure of the participants within the study, vernacular names of the plants, preparation methods and their utilized parts were recorded.

Demographic structures of the respondents

Demographic structures of the attendees were identified and recorded via face to face interviews. A total of 16 people with an age of above 36 were



Fig. 1 — Map of the research area

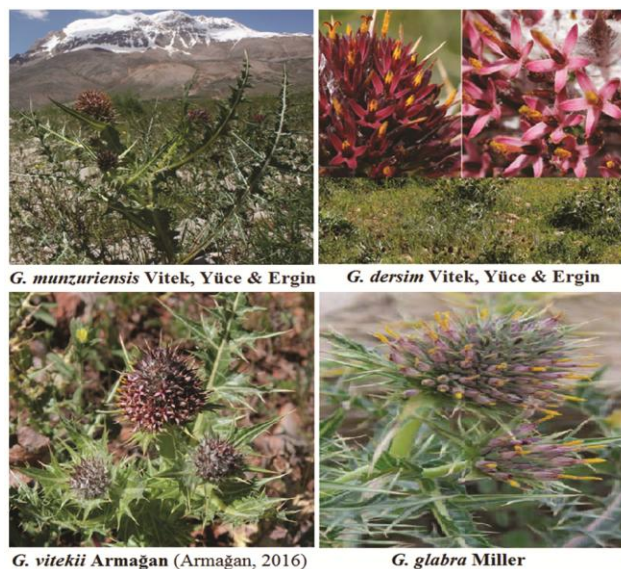


Fig. 2 — *Gundelia* L. species

Table 1 — The locations of collection for the specimens

No.	Family	Plant species, collection areas	Vernacular name in Tunceli
1	Compositae	<i>Gundelia dersim</i> Vitek Yüce & Ergin – Tunceli, Aktuluk (39° 0' 5" N / 39° 29' 6" E), Yüce-Çakılcıoğlu, 2015-09	Kenger, Keleng
2	Compositae	<i>G. munzuriensis</i> Vitek Yüce & Ergin – Tunceli, Ovacık (39° 20' 59" N / 39° 17' 19" E), Yüce, 2016-23	Kenger, Kereng
3	Compositae	<i>G. glabra</i> Miller – Tunceli, Ovacık (39° 25' 59" N / 39° 22' 07" E), Yüce, 2016-17	Kenger, Kereng
4	Compositae	<i>G. vitekii</i> Armağan – Tunceli, Pülümür (39° 25' 33" N / 39° 43' 22" E), Yüce-Çakılcıoğlu, 2016-13	Kenger, Kereng

interviewed within the study. The mean age of the interviewees was around 49 years. All female attendees (plant user) were housewives while 31.6% of male users were farmers, 14.1% were unemployed and others engaged with several types of different occupations. Of the participants, nine were male and seven were female.

Results and Discussion

Use of Kenger as food and literature review

Kenger (*Gundelia* L.) plant is traditionally used as food in many parts of Anatolia. New species have been discovered recently. Therefore, it has been noted that the *Gundelia tournefortii* L. plant is often used²⁴⁻²⁹. In Tunceli and many surrounding cities, the young stems of plants are collected and sold in bazaar.

We recorded *G. dersim*, *G. munzuriensis*, *G. glabra*, *G. vitekii* as being used for nutritional purposes, which we found out during the interviews in the present study. The way of use of these four kenger species which grow naturally in and around Tunceli are:

Egg meal with olive oil: The leaves of the plant from the young stems and thorns are roasted with olive oil and eggs are broken and cooked together thereon (Fig. 3a).

Watery food with rice: The young leaves and stems of the plant are chopped and boiled in water (Fig. 3b). Then oil, tomato paste, onion and rice are added, followed by cooking.

Food with garlic yogurt: The young leaves of the plants are chopped and boiled in water. Boiled leaves are thoroughly filtered and then consumed with garlic yogurt (Fig. 3c). Plenty of stems of the plants collected during the season are frozen and stored in the freezer. During seasons other than the harvest season, the plant is used as food (Fig. 3d).

Salad: The young leaves are washed and chopped, then consumed with tomato, cucumber, olive oil and lemon.

Pickle: Before the plant matures, its roots and leaves are cut and separated. Pickle of the plant is prepared by adding water, salt, vinegar or lemon into the stem thereof (Fig. 3e).

Gums: As the foliation begins, the soil around the root is dug to a depth of 10 cm and cleaned; thereafter the plant body is cut diagonally at the soil level. The plant latex flows over the soil from the cut out section. A day later, latex hardened on the soil is collected and washed with water. The prepared gum is chewed (Fig. 3f). These gums are strung, filled into jars with water and sold in local bazaars.

Coffee: The seeds are roasted and boiled with water to make coffee. It has also been reported in the literature that it is consumed as coffee (Tanker and Tanker, 1967)³⁰. Besides, it is told that in the famine that was also experienced in Turkey during the Second World War, kenger coffee was consumed³¹.

Cookies: Kenger seeds are roasted and eaten as a snack by local people (Fig. 3g). The seed of the plant is a good source of minerals such as Ca, K, P, Fe, Mg,



Fig. 3 — Traditional uses of Kenger plant as food. a. Egg meal with olive oil. b. Watery food with rice. c. Food with garlic yogurt. d. Stems of the plants stored in the freezer. e. Pickle. f. Gums. g. Cookies. h. Animal feed.

Na, Zn as well as being rich in crude oil (16%), crude protein (12%) and fiber (27%). It is important for nutrition as it contains tocopherols, fatty acids and sterols³².

Animal feed: The young leaves of the plants are also collected and, fed to the animals (Fig. 3h).

In our literature research, kenger was also used for producing "Teleme". During Teleme production, the milk is boiled and kept until the temperature of the yoghurt fermentation is reached, and stirred continuously by adding parts of the plants or the extract thereof. After a while, once the milk gets a solid appearance, the Teleme is obtained. Teleme can be consumed with honey, sugar, jam, or molasses, thereof³³.

Kenger is used both in the traditional culture of Anatolia and mentioned in local folkloric songs and proverbs³⁴.

Medicinal plants

The usually of Kenger used in Tunceli for food purposes are also used both in Tunceli and other regions for medicinal purposes. For example, *Gundelia* L. was used for aphrodisiac, diabetes, diarrhea, and digestive³⁵⁻³⁷. Thistle chewing gum strengthens the gingiva and works up the appetite. It is asserted that the gum extracted from the roots of thistle can kill stomach pain with the help of bitter water that comes off while chewing. Besides, if a piece of thistle chewing gum is eaten, it can stop diarrhea³⁸⁻³⁹.

Conclusion

People have always benefited from naturally grown plants in their environment. Kenger plant is widely distributed in Turkey and is generally used for medicinal purposes. Nine different uses of four Kenger plants as food, which are grown naturally in Tunceli have been recorded. Traditional uses in Turkey usually belong to the species *Gundelia tournefortii* L. Recently discovered three kenger plants (*G. dersim*, *G. vitekii*, *G. munzuriensis*) in Tunceli have been recorded for the first time.

In Turkey, the number of ethno-botanic studies is ever increasing. But, the plants uses of many wild plants taxa have not been recorded yet.

References

- 1 Kargioğlu M, Cenkeci S, Serteser A, Evliyaoglu N, Konuk M, Kök MŞ & Bağcı Y, An ethnobotanical survey of inner-West Anatolia, Turkey, *Hum Ecol*, 36 (2008) 763-77.
- 2 Ertuğ F, Wild edible plants of the Bodrum Area (Muğla, Turkey), *Turk J Bot*, 28 (2004) 161-174.
- 3 Polat R, Çakılcıoğlu U, Ertuğ F & Satıl F, An evaluation of ethnobotanical studies in Eastern Anatolia, *Biol Divers Conserv*, 5 (2) (2012) 23-40.
- 4 Akgül G, Yılmaz N, Celep A, Celep F & Çakılcıoğlu U, Ethnobotanical purposes of plants sold by herbalists and folk bazaars in the center of Cappadocia (Nevşehir, Turkey), *Indian J Tradit Know*, 15 (1) (2016) 103-108.
- 5 Korkmaz M, Karakuş S, Selvi S & Çakılcıoğlu U, Traditional knowledge on wild plants in Üzümlü (Erzincan-Turkey), *Indian J Tradit Know*, 15 (4) (2016) 538-545.
- 6 Polat R, Satıl F & Çakılcıoğlu U, Medicinal plants and their use properties of sold in herbal market in Bingöl (Turkey) district, *Biol Divers Conserv*, 4 (3) (2011) 25-35.
- 7 Polat R, Selvi S, Çakılcıoğlu U & Açar M, Investigations of ethnobotanical aspect of wild plants sold in Bingöl (Turkey) local markets, *Biol Divers Conserv*, 5 (3) (2012a) 155-161.
- 8 Satıl F & Selvi S, Ethnobotanical features of *Ziziphora* L. (Lamiaceae) Taxa in Turkey, *Int J Nature Life Sci*, 4 (2020) 56-65.
- 9 Mittermeier R A, Gil P R, Hoffman M, Pilgrim J, Brooks T, Mittermeier J C, Lamoreux J & da Fonseca G A B, *Hotspots Revisited: Earth's biologically richest and most endangered terrestrial ecoregions*, Amsterdam Univ Press, Amsterdam; 2005.
- 10 Vitek E, Yüce E & Ergin C, *Gundelia dersim* and *Gundelia munzuriensis* (Compositae), two new species from Turkey, *Phytotaxa*, 161 (2014) 130-138.
- 11 Vitek E, Yüce E & Çakılcıoğlu U, *Gundelia glabra* Miller (Compositae) - an ignored taxon. *Ann Natur Hist Mus Wien B*, 119 (2017) 235-242.
- 12 Armağan M, *Gundelia vitekii* (Compositae), a new species from Turkey, *Ann Natur Mus Wien B*, 118 (2016) 129-134.
- 13 Şengün M T, The effect of Keban Dam Lake to Elazığ climate under the last valuations light, *Fırat Univ J Res East Anatol Reg*, 5 (2007) 116-121.
- 14 Davis P H, *Flora of Turkey and the East Aegean Islands*, Edinburgh University Press, Edinburgh, (1965-1985) 1-9.
- 15 Yıldırım Ş, *Munzur Dağları Florası Üzerinde Bir Arastırma*, TBAG-415 proje, Ankara; 1982.
- 16 Davis P H, Mill R R & Tan K, *Flora of Turkey and the East Aegean Islands*, Vol. 10 (ed.), Edinburgh Univ. Press, Edinburgh, (1988) 1-590.
- 17 Karavelioğulları F A, Yüce E & Başer B, *Verbascum duzgunbabadagensis* (Scrophulariaceae), a new species from Eastern Anatolia, Turkey, *Phytotaxa*, 181 (2014) 47-53.
- 18 Armağan M, *Gypsophila munzuriensis* (Caryophyllaceae), a new species from Tunceli (Turkey), *Phytotaxa*, 275 (2017) 175-180.
- 19 Yüce Babacan E & Eker İ, Munzur Vadisi ve yakın çevresinin geofit florası, *Bağbahçe Bil Der*, 4(1) (2017) 31-49.
- 20 Kupicha F K, *Gundelia*, In: *Flora of Turkey and the East Aegean Islands*, Vol. 5, Davis P H (ed.), Edinburgh Univ. Press, Edinburgh; (1975) 325-326.
- 21 Rechinger K H, *Gundelia*, In: *Flora Iranica* 164, Rechinger K H (ed.), Akademische Druck- und Verlagsanstalt, Graz; (1989) 107-109.
- 22 Vitek E & Jarvis C E, The typification of *Gundelia tournefortii* L. (Compositae), *Ann Natur Hist Mus Wien B*, 108 (2007) 267-272.

- 23 Vitek E, Leschner H & Armağan M, *Gundelia tournefortii* L. (Compositae) – an approach, *Ann NaturhistMus Wien B*, 119 (2017a) 227-233.
- 24 Nadiroğlu M & Behçet L, Traditional food uses of wild plants among the Karlıova (Bingöl-Turkey), *Int J Nature Life Sci*, 2 (2) (2018) 57-71.
- 25 Kaval İ, Behçet L & Çakılciöğlü U, Survey of wild food plants for human consumption in Geçitli (Hakkari/Turkey), *Indian J Tradit Know*, 14 (2) (2014) 183-190.
- 26 Polat R, Çakılciöğlü U, Uluşan M D & Paksoy M Y, Survey of wild food plants for human consumption in Elazığ (Turkey), *Indian J Tradit Know*, 1 (1) (2015a) 69-75.
- 27 Mükemre M, Behçet L & Çakılciöğlü U, Survey of wild food plants for human consumption in villages of Çatak (Van-Turkey), *Indian J Tradit Know*, 15 (2) (2016) 181-191.
- 28 Güneş S, Savran A, Paksoy M Y, Koşar M & Çakılciöğlü U, Ethnopharmacological survey of medicinal plants in Karaisalı and its surrounding (Adana-Turkey), *J Herbal Med*, 8 (2017) 68-75.
- 29 Polat R, Güner B, Yüce Babacan E & Çakılciöğlü U, Survey of wild food plants for human consumption in Bingöl (Turkey), *Indian J Tradit Know*, 16 (3) (2017) 378-384.
- 30 Tanker M & Tanker N, Kenger kahvesini veren bitki: *Gundelia tournefortii* L., *İstanbul Ecz Fak Mec*, 63 (3) (1967) 63-74.
- 31 Başer K H C, Türkiye'nin yenen yabancı bitkileri, *Bağbahçe Bil Der*, 29 (2010) 22-25.
- 32 Matthaus B & Özcan M M, Chemical evaluation of flower bud and oils of tumbleweed (*Gundelia tournefortii* L.) as a new potential nutrition sources, *J Food Biochem*, 35 (2011) 1257-1266.
- 33 Say D & Güzeler N, Some plants used in milk clotting, *Neşehir Bilim Teknol Der*, Special issue (2016) 253-261.
- 34 Tecer A K, *Halk Edebiyatı*, Türk Dili ve Edebiyatı Araştırmaları, Dil ve Tarih Coğrafya Fak, İstanbul; 1941.
- 35 Cakılcioglu U & Turkoglu I, An ethnobotanical survey of medicinal plants in Sivrice (Elazığ-Turkey), *J Ethnopharmacol*, 132 (1) (2010) 165-175.
- 36 Polat R, Cakılcioglu U & Satıl F, Traditional uses of medicinal plants in Solhan (Bingöl-Turkey), *J Ethnopharmacol*, 148 (3) (2013) 951-963.
- 37 Çakılciöğlü U, Şengün M T & Türkoğlu I, An ethnobotanical survey of medicinal plants of Yazikonak and Yurtbaşı districts of Elazığ province, Turkey, *J Med Plants Res*, 4 (7) (2011) 567-572.
- 38 Çakılciöğlü U, Türkoğlu İ & Kurşat M, Ethnobotanical features of Harput (Elazığ) and its vicinity, *Fırat Univ Doğu Anadolu Böl Araş Der*, 5 (2) (2007) 22-28.
- 39 Kawarty A M A M A, Behçet L & Çakılciöğlü U. An ethnobotanical survey of medicinal plants in Ballakayati (Erbil, North Iraq), *Turk J Bot*, 44 (2020) 345-357.

Appendix A

SURVEY FORM				
Name and surname of the participant:.....				
Sex and age:.....				
Place of residence:.....				
Educational status:.....				
Job status:.....				
Date:.....				
The vernacular name of the plant used?	Parts of the plant used (Root, flower, leaves, whole plant. etc.)?	What foods do you make (Pickle, salad, gums etc.)?	How do you prepare the plant for use?	How do you use the plant?