

**ANATOMICAL CHARACTERISTICS OF *Centaurea glastifolia* L.  
(Asteraceae) USED AS FOLK MEDICINE IN EAST ANATOLIA**

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**S U M M A R Y**

The aerial parts of *Centaurea glastifolia* L. are used as hemostatic, vulnerary and appetizer in Iğdır province (East Anatolia). Anatomical characteristics of used parts (leaves and stems) of the *C. glastifolia* L. have been studied. The leaves of *C. glastifolia* L. are amphistomatic and isolateral. Stomata cells are anomocytic. Leaves and stem have long covering hairs and short stalked glandular hairs. Druses aren't observed.

**Ö Z E T**

*Centaurea glastifolia* L. türünün toprak üstü kısımları Iğdır (Doğu Anadolu Bölgesi) ilinde kan durdurucu, yara iyileştirici ve iştah açıcı olarak kullanılmaktadır. Türün kullanılan kısımlarının anatomik özellikleri incelenmiştir. Yaprakları amfistomatik ve izolateraldir. Stoma hücreleri anomositiktir. Yaprak ve gövde üzerinde uzun örtü tüyleri ve sapları kısa, başları büyük salgı tüyleri taşır. Druz gözlenmemiştir.

**Key words:** *Centaurea glastifolia* L., leaf anatomy, stem anatomy, Iğdır (Turkey).

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## INTRODUCTION

A serial study of anatomical characteristics of Turkish folk medicinal plants and poisonous plants have been started to study at Istanbul University Faculty of Pharmacy Department of Pharmaceutical Botany. This study is the first of these series.

*Centaurea* L. is the biggest genus of Asteraceae family in Flora of Turkey, represented by 196 species, of which 64 % are endemic (1, 2, 3, 4, 5). In recent studies *Centaurea* L. genus has been divided into four genera: *Centaurea* L., *Rhaponticoides* Vaill., *Psephellus* Cass. and *Cyanus* Mill. (6). *Centaurea glastifolia* is belong to the genus of *Centaurea* L. (sect. *Chartolepis* (Cass.) DC.)

*Centaurea* species are generally known as knapweed, also different local names like; Ak behmen, Zerdali diken, Çoban kaldıran, Gökbaş etc. Most species are used in Anatolia as antipyretic (7, 8). *Centaurea glastifolia* L. is known in East Anatolia Region as kotankıran, and in Iğdır province it is named as Kötankoparan (plow crusher). It has stout roots and therefore when farmers cut the weed, its roots sometimes crack their harvester and that's why it is called like kotankıran or kötankoparan in East Anatolia. Its herba is used as appetizer in East Anatolia (7). During the PhD thesis named "Uses of the Wild Plants in Iğdır Province (East Anatolia)" it was recorded that, its leaves are used as hemostatic and vulnerary in the studied area. Due to the absence of any anatomical studies on *Centaurea glastifolia* L., this present study was undertaken to provide a detailed account of the anatomical characteristics of it.

## MATERIAL AND METHODS

*Centaurea glastifolia* samples were collected from B9 Iğdır: Tuzluca, 39° 57' 39" N, 43° 29' 44" E, 2018 m, 21.07.2008 in Turkey. Voucher specimens are housed at the herbarium of ISTE (ISTE 85 782). Permanent microscopic preparations were made of plant material fixed in field in 70 % alcohol. Cross sections of the plant leaves and stem, and surface sections of leaves taken by free-hand and stained with Sartur solution (9). The well-staining sections were photographed on Philips digital color camera type LTC 0600/50 and Olympus BH-2 light microscope. Leica S8APO trinocular microscope and Leica DFC 295 camera, and also a Leitz SM-LUX light microscope with a drawing tube were used for the surface sections.

## RESULTS AND DISCUSSION

### 1. Morphological characteristics of *Centaurea glastifolia* L.

It is perennial. Flowering stem is erect, 40-85 (-150) cm, winged for most of its length, with few branches near top. Leaves scabrous with very short hairs, sometimes also arachnoid and entire. Basal and lower leaves are petiolate and lanceolate. Median

and upper leaves are sessile, decurrent, gradually narrowing, uppermost nearly linear. Involucre 22-29 x 20-30 mm, nearly globose.

Appendages are very large and totally concealing basal part of phyllaries, orbicular, shortly decurrent, (8-) 10-15 mm broad and hyaline with firmer dark brown centre, its margin is minutely denticulate and lacerate. Flowers are yellow, marginal not radiant. Achenes 6 mm; pappus 11-13 mm, plumose.



**Fig. 1:** *Centaurea glastifolia* L.

Flowering time: July-August.

Habitat and altitude: Meadows, rocky slopes. 1500-2500 m.

Distribution in Turkey: Mainly East Anatolia.

General distribution: Transcaucasica.

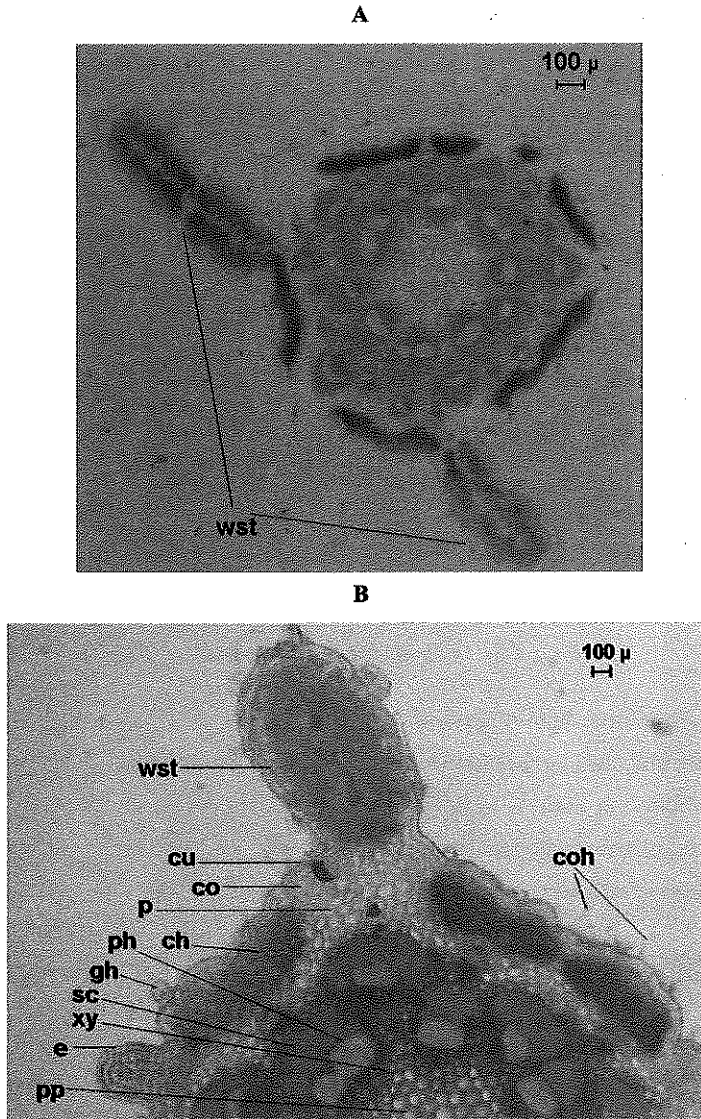
Phytogeographical region: Iranian-Turanian element (1).

## **2. Anatomical characteristics of *Centaurea glastifolia***

### **a. Herbaceous Stem**

A cross section was taken from the middle part of the stem. In cross sections stem is pentagonal and winged. The epidermis consist of a single layered, flattened, roundish or ovate cells. It is surrounded by a thick cuticle layer. It has covering short stalked and big head glandular hairs and covering hairs which are many celled, uniseriate and recurved. Underneath the epidermis, there is collenchyma with single layered cell, but 2-3 layers of collenchyma can be seen below the epidermis at the stem

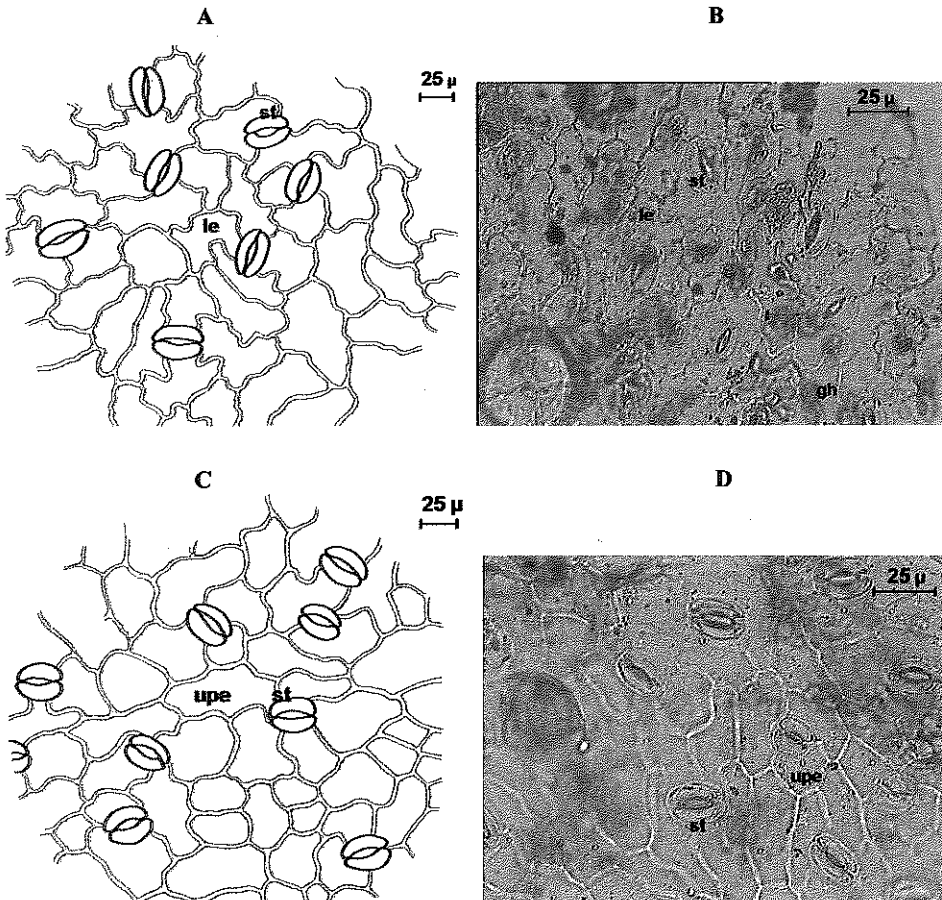
ridges. Along cortex, there is parenchyma in corners and chlorenchyma is located between corners. Vascular bundles are collateral type and are surrounded by sclerencymatic tissue. Phloem and xylem members are clear. Parenchymatic pith cells situated centre of the stem are polygonal and rounded (Figure 2, 3).



**Figure 2:** A- Cross section of the whole stem. B- Cross section of the winged part of stem. Wst, winged stem tissue; cu, cuticle; co, collechyma; p, parenchyma; ch, chlorenchyma; ph, phloem; gh, glandular hair; sc, sclerenchyma; xy, xylem; e, epidermis; pp, parenchymatic pith; coh, covering hairs.

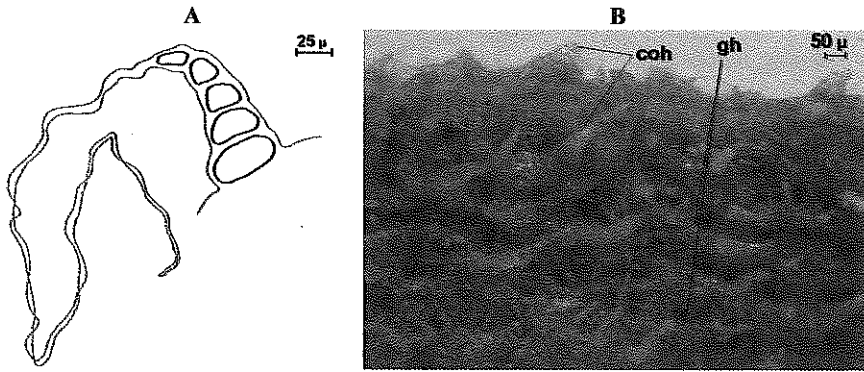
### a. Leaf

The leaves are amphistomatic. Stomata cells occur on the both surfaces with 3 or 4 neighboring cells. There is short stalked and big head glandular hairs and uniseriate, unicellular and multicellular covering hairs both on the upper and lower side of the leaves. Multicellular covering hairs' cell-walls are thick and they have 5-9 cells at their part of base, and very long white hair. Lower epidermis are more undulate than upper epidermis (Fig. 3, 4 and 6-B).



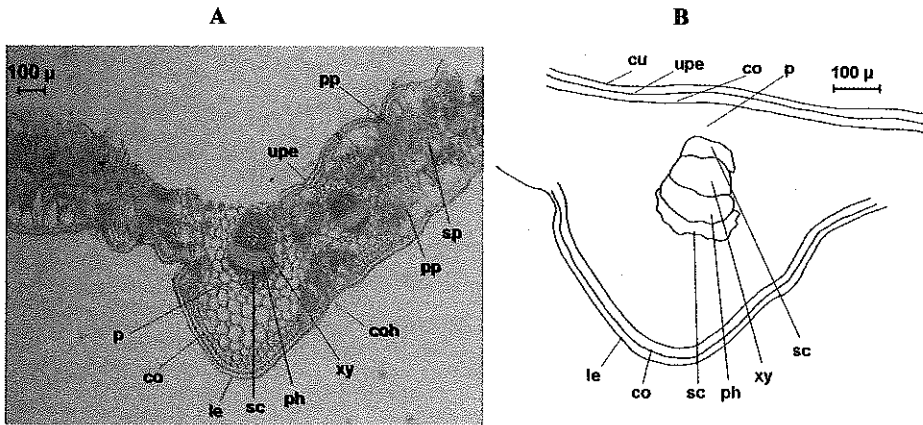
**Figure 3:** Surface sections of leaf. A-B le, lower epidermis; st, stomata, gh, glandular hair. C-D upe, upper epidermis; st, stomata.

Stomata index of upper epidermis is 16.10 %, and lower epidermis is 15.41 %.



**Figure 4:** Trichomes A- multicellular covering hair. B- coh, covering hairs; gh, glandular hair.

In cross sections of the lamina, midrib is nearly triangular shaped and has 1-2 layered collenchyma located below the both epidermal cells. The epidermis consist of single layered, flattened and ovate cells. It is surrounded by thin cuticle. The leaves are isoateral. There are palisade and spongy parenchyma in the below upper and lower epidermis. Vascular bundles are collateral and consist of xylem, phloem and sclerenchyma cells (Fig. 5 and 6).



**Figure 5:** Cross section of the midrib. pp, palisade parenchyma; p, parenchyma; co, collenchyma; le, lower epidermis; sc, sclerenchyma; ph, phloem; xy, xylem; coh, covering hairs, sp, spongy parenchyma.

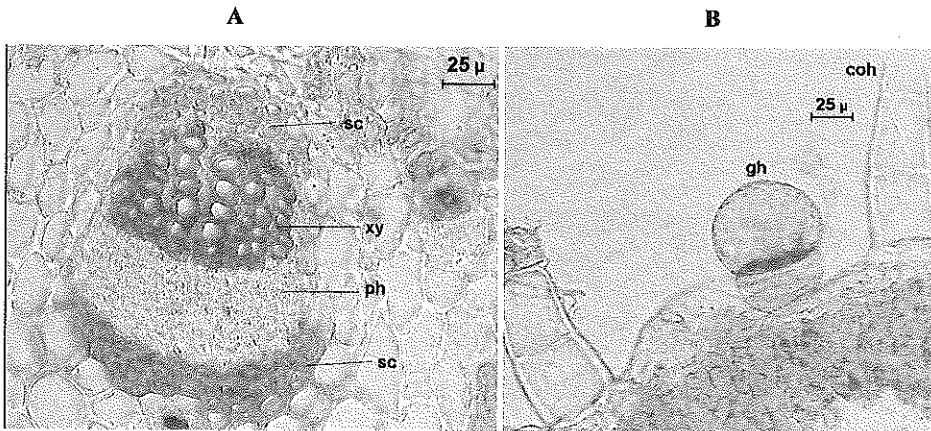


Fig. 6: A- Cross section of the midrib. p, parenchyma; e, epidermis; sc, sclerenchyma; ph, phloem; xy, xylem. B- Cross section of leaf. gh, glandular hair; coh, covering hair.

This is the first detailed anatomical study on *Centaurea glastifolia*. It has cuticle on both stem and leaf epidermis. It has typical Asteraceae trichomes, uniseriate, unicellular and multicellular long covering hairs both and short stalked, big head glandular hairs on the epiderma. Vascular bundle is placed into sclerenchymatic tissue. Mesophyll tissue is dominantly comprised of palisade parenchyma. Spongy parenchyma in the leaf is highly reduced as in the other xerophytes. These anatomic features of this species are compared with other studies on *Centaurea* species, and Asteraceae family, it has similar properties with these studies (10, 11, 12, 13).

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