

## The synopsis of the genus *Echinophora* L. (Apiaceae) in Turkey

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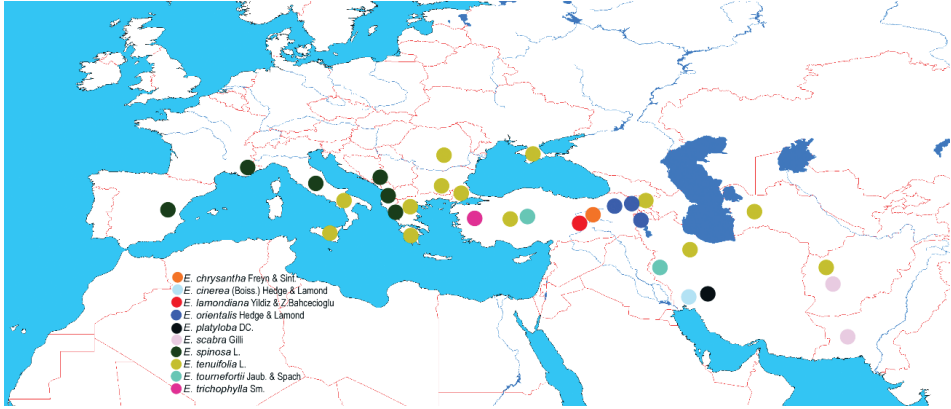
**Abstract:** The genus *Echinophora* (Apiaceae) is represented in the flora of Turkey by six species including three endemics. These are: *E. tenuifolia* subsp. *sihthorpiana*, *E. tournefortii*, *E. orientalis* and three endemic species: *E. chrysantha*, *E. trichophylla* and *E. lamondiana*. The *Echinophora* species are also used in folk medicine to heal wounds and to treat gastric ulcers and also used spice for food. *E. tenuifolia* subsp. *sihthorpiana* known as “Çörtük, Cördük, Tarhana Otu or Tursu otu” in Turkish and its the most widely used species in genus *Echinophora* in Turkey. In this study; the diagnostic fruit characters of the genus are described; the geographic distribution in the world and Turkey of the genus is mapped. And ethnobotanical uses of the species in Turkey has been compiled and given with a table.

**Key words:** *Echinophora*, Apiaceae, Ethnobotany, Turkey, Anatolian diagonal

### Introduction

The genus *Echinophora* L. (Fam. Apiaceae, subfamily Apioideae, tribe Echinophoreae) comprises about 10 species in the world, which are ranging from the Mediterranean region eastwards to Afghanistan (Mabberley, 1997) (Figure 1). Three taxa of the genus distributed in Europe (*E. spinosa* L., *E. tenuifolia* L. subsp. *sibthorpiana* (Guss.) Tutin and *E. tenuifolia* L. subsp. *tenuifolia*) (Tutin, 1968).

The genus is represented in the flora of Iran by five taxa is below: *E. tenuifolia* subsp. *sibthorpiana*, *E. orientalis* Hedge et Lamond, *E. tournefortii* Jaub. & Spach and two endemic species, which are *E. platyloba* DC. and *E. cinerea* (Boiss.) Hedge et Lamond. *E. scabra* Gilli is distributed in Afghanistan and Pakistan (Hedge & Lamond 1987) (Figure 1).



**Figure 1:** The distribution map of *Echinophora* taxa in the world.

The genus *Echinophora* was revised by Hedge & Lamond (1972) for the Flora of Turkey and the East Aegean Islands. It's represented in this study by six species including two endemic. Afterward *E. carvifolia* Boiss. & Bal. was transferred to the genus *Thecocarpus* Boiss. (Hedge & Lamond, 1973). Finally a new species has been described for science (Yıldız & Bahçecioglu, 1997; Özhatay et al., 1999). As a result of these changes; genus *Echinophora* comprises 6 species (3 endemic) in Turkey (Menemen, 2012).

- E. chrysantha* Freyn & Sint. (Endemic)
- E. lamondiana* Yıldız & Z.Bahcecioglu (Endemic)
- E. orientalis* Hedge & Lamond
- E. tenuifolia* subsp. *sibthorpiana* (Guss.) Tutin
- E. tournefortii* Jaub. & Spach
- E. trichophylla* J. E. Smith (Endemic)

## Results and discussion

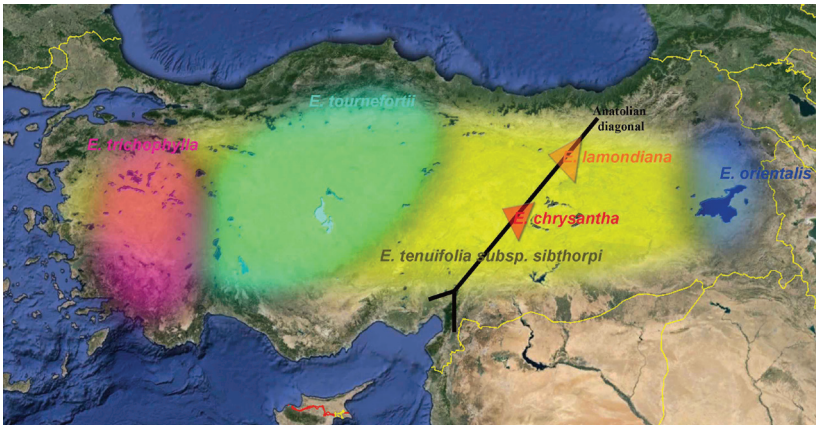
### Distribution:

*E. tenuifolia* L. subsp. *sibthorpiana* is the most widely distributed species in Turkey. On the other hand, distribution areas of other species are divided by Anatolian Diagonal where it is a hypothesis suggested by Davis (1971). According to this hypothesis there was a distributional floral break

in Central Anatolia; many species do not occur west of the hypothetical Diagonal and likewise significant numbers are not known to the East of it. Distribution of the genus *Echinophora* support Davis's hypothesis (Figure 2).

According to Ekim & Güner (1986) neo-endemism and distribution patterns of the plants are related to the Anatolian Diagonal.

*E. lamondiana* and *E. chrysantha* which are endemic species distributing on diagonal (Figure 2). Therefore, these distributions supports the hypothesis that a relevance between the diagonal with neoendemic species.



**Figure 2:** The distribution map of *Echinophora* genus in Turkey.

### Diagnostic Characters:

*Echinophora* differs from other genus with characteristics of umbellules that occurs with central, sessile and female flowers and outer male with their connate pedicels.

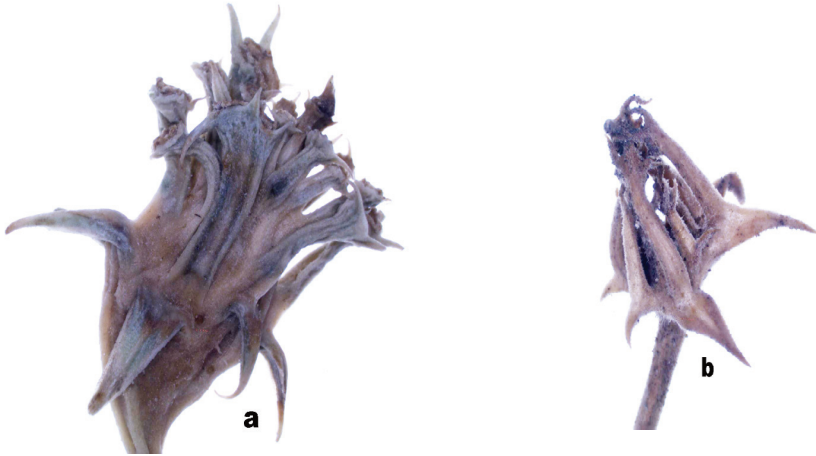
The genus divided into two sections and six species are separated equally into sections in Turkey.

Sect. *Echinophora* L.: *E. tournefortii*, *E. orientalis*, *E. trichophylla*.

Sect. *Chrysophora* DC: *E. chrysantha*, *E. lamondiana*, *E. tenuifolia* subsp. *sibthorpiana*.

These two sections of the fruit characteristics differ from each other. In sect. *Echinophora* pedicels of umbellule growing larger after flowering, the inner fusing to form a shell around the sessile mericarps (Figure 3a). In sect. *Chrysophora*, at fruiting stage pedicels of umbellule thickening and forming a cage around the sessile mericarps but never conerescent (Figure 3b).

The position of umbels, colour of petals, spines of plants, segments of basal leaves are other diagnostic characters of the species.



**Figure 3:** Fruit types of *Echinophora* a. sect. *Echinophora* (*E. orientalis*), b. sect. *Chrysophora* (*E. tenuifolia* subsp. *sibthorpiana*)

### **Ethnobotany and *Echinophora*:**

The *Echinophora* species are also used in folk medicine to heal wounds and to treat gastric ulcers due to its antifungal, carminative and digestive properties (Baytop, 1984). But neither the plant nor its oil has any antibacterial or antifungal activities (Kıvanç, 1988).

However, the aerial parts of the taxa ethnobotanical uses has been reported in different researches (Table). *E. tenuifolia* subsp. *sibthorpiana* known as “Çörtük, Cördük, Tarhana Otu or Tursu otu” in Turkish and it’s the most widely used species in genus *Echinophora* in Turkey (Figure 4).



**Figure 4:** *E. tenuifolia* subsp. *sibthorpiana*

The genus *Echinophora* has been the subject of scant phytochemical and biological investigations. The chemical composition and antimicrobial activity of the oils of some *Echinophora* species have been investigated also (Tsukervanik & Martynova, 1937; Tanker et al., 1976; Kıvanç, 1988; Akgül & Chialva, 1989; Başer et al., 1994; 1998; 2000; Ahmad et al., 1999).

**Table:** Ethnobotanical uses of *Echinophora* in Turkey

Species	Local name	Used parts	Uses	Reference
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Çörtük	Aerial parts	Antispasmodic, digestive (infusion)	Çakılcıoğlu & Türkoğlu (2010).
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Çörtük, Tarhana otu	Aerial parts	Gastric ulcer (infusion)	Çakılcıoğlu et al. (2007); Fakir et al. (2009)
<i>E. tournefortii</i>				
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Tarhana otu	Aerial parts	Galactagogue: (infusion)	Ünsal et al. (2010)
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Çördük	Aerial parts	Added as an aromatic food preserver to prevent pickles	Kargıoğlu, et al (2008); Çakılcıoğlu et al. (2007); Kargıoğlu et al. 2010
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Çördük, Çörtük, Tarhanaotu	Aerial parts	Added as an aromatic food to tarhana (a kind of soup)	Doğan et al 2004; Ertuğ (2004); Doğan (2012); Çakılcıoğlu et al. (2007); Kargıoğlu et al. 2010
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Mellik, Bılbıl, Dereotu	Aerial parts	As spice	Akan et al. (2008a).
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Çörtük	Aerial parts before flowering period	As spice on the herbal chesee	Özçelik (1994).
<i>E. orientalis</i>				
<i>E. tenuifolia</i> subsp. <i>sibthorpiana</i>	Meylemok, Çortik	Aerial parts	When making, immersed molasses to add flavor	Akan et al. (2008b).

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