

*Original research***An alien species of *Bidens* (Asteraceae): *Bidens pilosa* L., new to the Turkish flora****Hasan YILDIRIM^{1,*}, Tuğkan ÖZDÖL¹, Hasan YAŞAYACAK²**¹Department of Biology, Faculty of Science, Ege University, TR-35100 Bornova-Izmir, Turkey.²Department of Forestry Engineering, Faculty of Forestry, Karadeniz Technical University, TR- 61080 Trabzon/Turkey

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Abstract: *Bidens pilosa* L. was collected during field trip to Osmaniye/Turkey in September 2018. *Bidens pilosa* is a recorded a new taxa for Flora of Turkey. It's diagnostic characters, description and photographs are given in article. The geographical distribution in Turkey of the new record is mapped. *Bidens pilosa* is slightly related to *Bidens frondosa*, but it is distinctly separated from *Bidens frondosa* by short spatulate calycular bracts, (2-)3-4 barbellate awns of achenes, with white ray florets, ray florets at least 2-times longer than disc florets, longer stem, beneath of leaf usually dense pillosulose-tomentose indumentum.

Keywords: *Bidens* L., Asteraceae, New record, Flora, Turkey

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Introduction

The genus *Bidens* L. is first described to science by Linnaeus in Species Plantarum Volume 2 (Linnaeus, 1753). This genus belongs to tribe Coreopsideae / subtribe Coreopsidinae of family Asteraceae. The tribe Coreopsideae contains 30 genera and approximately 550 species with a worldwide distribution. (Panero, 2007). Most of the species under subtribe Coreopsidinae (especially *Bidens* L. species) are distributed in America, especially North America. (Panero, 2007).

Bidens L. is represented about 280 species (Panero, 2007) on worldwide, generally distributed near Roadsides and in fields (Chen & Hind, 2011). It is represented by 5 species in Turkey (Kupicha, 1975; Güner, 2000; Coşkunçelebi et al., 2007; Korkmaz et al. 2011; Güner et al., 2012). Most of the *Bidens* species shows cosmopolite distribution. This genus is an alien genus for Turkey's flora (Güner et al., 2012), all taxa of *Bidens* are invasive plant for Turkey Flora.

Bidens pilosa L., commonly known as Spanish needle, is also an invasive species that distributed and recorded from to south of North America, South America, West and South Africa, East of Suez Canal, West, North, South and Middle Europe, South-East Asia, North and South-East Australia and some of Pacific and Atlantic islands (GBIF, 2018) to date (Fig. 1).

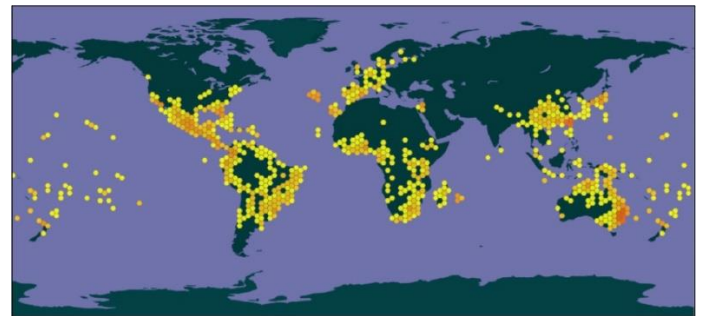


Figure 1. Worldwide distribution map of *Bidens pilosa* in the (obtained from GBIF).

Bidens pilosa is used in traditional medicines. it is reported to treat various diseases and infections, commonly rheumatism, diarrhoea, ear, eyes and tooth ache problems, for treating malaria, skin infections, stomach and liver disorders. Also *B. pilosa* is a source of natural anti-microbials anti-inflammatory hepatoprotective and cytotoxic against various cancer cells. (Pereira et al., 1999; Khan et al., 2001; Sundararajan et al., 2006; Yuan et al., 2008; Kumari et al., 2009; Pozharitskaya et al., 2010; Fotso et al., 2014; Silva et al., 2014; Singh et al., 2017)

Materials and methods

Mehmet Çelik, who is an amateur botanist and nature lover, collected an interesting specimen of *Bidens* from Osmaniye-Kırımıtlı Province. He sent some interesting pictures of this specimen to me for identification in 2017. In 2018, we gathered flowering and fruiting material from the natural population of this plant. All samples were compared with many other *Bidens* specimens on relevant literature (Linnaeus, 1753; Boissier, 1875; Kupicha, 1975; Tutin, 1976 Boufford, 2006; Chen & Hind, 2011) was taken into consideration. After close examination of the specimens, we concluded that the collected specimens belonged to *Bidens pilosa* L., which is firstly recorded from Turkey. Photographs of plant specimens and plant parts were taken at herbarium and natural habitats. Morphological characters were measured by a millimetric ruler under a stereo binocular microscope.

Results

Bidens pilosa L. Sp. Pl. 2: 832. 1753. (Fig.2-3)

Lectotype: Herb. Linn.-975.8. (LINN! [http://linnean-online.org/9905/]). Lectotype designated by: D'Arcy, W. G. 1975 [1976]. Flora of Panama, Part IX. Family 184. Compositae. V. Heliantheae. F. Coreopsidinae. Ann. Missouri Bot. Gard. 62(4): 1178.

Stem glabrous or subglabrous. Leaf 1-pinnately divided; segments 3–5, ovate, lanceolate; upper surface of lamina subglabrous, beneath tomentose, adpressed pilosulose, cuneate at base, apices mostly acute, sometimes acuminate, margins serrate; terminal leaflets 3–10 × 0.7–3.5 cm; lateral leaflets 1.5–6 × 0.3–2 cm; petiole 1–7 cm. Capitula solitary to corymbose; capitula radiate or discoid; peduncles 3–5 cm pilose, hispidulous, elongate in fruiting time; calycular bracts mostly 8,

spathulate to linear, 4–6 mm pilosus to pilosulose, hispidulous; involucre turbinate to campanulate, 4–8 × 6–10 mm; phyllaries mostly 8, lanceolate, 4–6 mm, margins scarious winged, ciliate. Ray florets mostly 5, lamina whitish, 10–12 mm. Disc florets 25–50, yellowish 3–5 mm, tubulate. Palea similar to phyllaries, slightly shorter or equal to disc flowers. Achenes dark brown to blackish, light brown to yellowish at apex, 6–10 mm, hispid to antrorsely hispidulous or strigose at apex; pappus (2–)3–4 barbed, 1–2.5 mm; outer achenes ± flat linear to narrowly cuneate, each surface obscurely 2-grooved, subglabrous at basal; inner achenes ± equally 4-angled, linear, surface of all side 2-grooved, truncate at apex.

Suggested Turkish name: The Turkish name of this species is given as “Tarlasuketeni”, according to the guidelines of Menemen et al. (2013).



Figure 2. *Bidens pilosa* from its natural habitats in Osmaniye (Figures taken by M. Çelik), A-Capitula; B-Leaves; C- Fruits.



Figure 3. Morphological characteristic of *Bidens pilosa*: A-Capitula; B-Leaves; C- Fruits; D-Leaves.

Distribution of *Bidens pilosa* in Turkey: Osmaniye: Kırmıtlı ile Yeniköy arası, Kırmıtlı içmesuyu sondaj alanı yanı, taşkın seddesi kenarı, sulama arkı çevresi, tarlalar arası, yol kenarı, sulama arkı boyunca, 37° 9'41.31"K, 36° 8'42.46"D 21.08.2018, H. Yıldırım 7694 (EGE!) (Fig. 4).

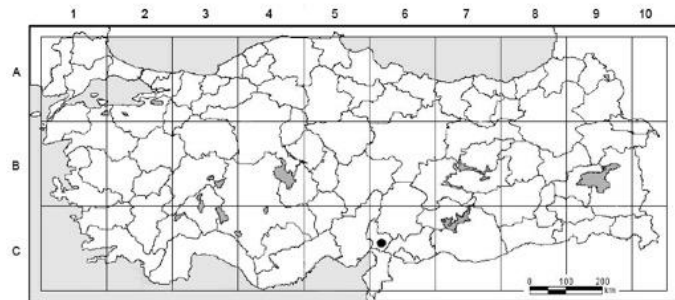


Figure 4. Distribution map of *Bidens pilosa* (●) in Turkey.

Discussion

Genus of *Bidens* L. is represented by 5 taxa in Turkey, which are *B. campylotheca* subsp. *pentamera* (Sherff) Ganders & Nagata, *B. cernua* L., *B. bipinnata* L., *B.*

frondosa L., and *B. tripartita* L. (Ekim, 2012). After this study, the number of *Bidens* L. taxa number has increased to 6 in Turkey border. *B. pilosa* morphologically is quite different from other *Bidens* taxa in Turkey. It is easily distinguished from other *Bidens* taxa in Turkey by its leaf segments, indumentum, calycular bracts and ray florets.

Bidens pilosa is slightly related to *B. frondosa*, but it is distinctly separated from *B. frondosa* by short spatulate calycular bracts, (2-)3-4 barbellate awns of achenes, with white ray florets, ray florets at least 2-times longer than disc florets, longer stem, beneath of leaf usually dense pillosulose-tomentose indumentum.

According to The Plantlist (2018), *B. pilosa* has 137 synonyms. It shows that, *B. pilosa* is a morphological high variety species.

Osmaniye province is located on the intersection point of 2 major flyways of migratory soaring birds that come from Europe and o Caucasian area. Most probably, *B. pilosa* carried by soaring birds to Osmaniye.

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