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A new variety of the *Bupleurum* (*Apiaceae*) from Türkiye

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Türkiye'den yeni bir *Bupleurum* (*Apiaceae*) varyetesi

Abstract: Some interesting *Bupleurum* (*Apiaceae*) specimens with very branched stems, (1–)2-rayed inflorescences and ivory-white bracteoles were collected from Tepebaşı District (Eskişehir Province). The specimes, at first glance, resembled the *Bupleurum pendikum* (sect. *Aristata*) species, which is endemic in Türkiye, as a habit. However, as a result of detailed examination, it was determined that there were some differences. Based on these differences, the specimens were presented to the scientific world as a new variety and were named *Bupleurum pendikum* var. *eskisehiricum*. The fact that the inflorescences are (1–)2 rays (not (2–)3–4(–5)); the bracteoles are 2.6–3.7 mm broad, ovate-elliptic and with arista up to 0.5 mm long (not 1.2–2 mm broad, lanceolate and with arista 1–1.5 mm long); the petals 0.6–0.8 mm broad (not 0.4–0.5 mm broad); the filaments 0.7–0.8 mm long (not c. 0.5 mm long) and the mericarps 2.7–3.1 × 1.1–1.3 mm (not 2.2–2.4 × 0.9–1 mm) are the most obvious attributes that separate *Bupleurum pendikum* var. *eskisehiricum* from *B. pendikum* (var. *pendikum*), that is a close taxon. Here, a detailed description of the new variety, informative photographs, and some ecological preferences were given.

Key words: *Bupleurum*, Eskişehir, new variety, taxonomy, Türkiye

Özet: Tepebaşı ilçesinden (Eskişehir) çok dallanmış gövdeli, (1–)2-ışınlı çiçek durumlu ve fildişi-beyazı bırakteollü olan bazı ilginç *Bupleurum* (*Apiaceae*) örnekleri toplandı. Örnekler ilk bakışta habit olarak Türkiye'de endemik olan *Bupleurum pendikum* (sect. *Aristata*) türüne benzetildi. Fakat yapılan detaylı inceleme sonucunda bazı farklar olduğu tespit edildi. Bu farklılıklara dayanarak, örnekler bilim dünyası için yeni bir varyete olarak tanıtıldı ve *Bupleurum pendikum* var. *eskisehiricum* olarak adlandırıldı. Çiçek durumu ışınlarının (1–)2 adet olması ((2–)3–4(–5) değil); bırakteollerinin 2.6–3.7 mm eninde, yumurtamsı-eliptik ve en fazla 0.5 mm uzunluğunda kılçıklı olması (1.2–2 mm eninde, mızraksı ve 1–1.5 mm kılçıklı değil); petallerinin 0.6–0.8 mm eninde olması (0.4–0.5 mm eninde değil); filamentlerinin 0.7–0.8 mm uzunluğunda olması (c. 0.5 mm değil) ve merikarpının 2.7–3.1 × 1.1–1.3 mm olması (2.2–2.4 × 0.9–1 mm değil) *Bupleurum pendikum* var. *eskisehiricum*'u yakın takson olan *B. pendikum* (var. *pendikum*)'dan ayıran en belirgin özelliklerdir. Burada; yeni varyetenin detaylı betimlemesi, bilgilendirici fotoğrafları ve bazı ekolojik tercihleri verilmiştir.

Anahtar Kelimeler: *Bupleurum*, Eskişehir, yeni varyete, taksonomi, Türkiye

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1. Introduction

Bupleurum L. is a genus of approximately 180 species in the world (Sheh and Watson, 2005). *Bupleurum* is also the genus including the most taxa in Türkiye and has become mostly adapted to the steppe habitat represented by 48 species. Approximately 44% of these taxa are endemic (Snogerup, 1972; Duman, 2000; Snogerup and Snogerup, 2001).

Some interesting *Bupleurum* specimens were collected during the "Biorestoration Observation Studies" held in 2022 within the scope of the Trans-Anatolian Natural Gas Pipeline Project (TANAP). The fact that they are ivory-white bracteoles and very branched stems are the attributes of the specimens that first draw attention. Specimens of the plants with flowers and ripe fruit, which has adapted to the dry marly places in oak and pine clearings, were collected around the end of August. It was decided at the conclusion of the investigation conducted and by considering the most recent revision studies and the *Flora of Turkey and the East Aegean Islands* that the specimens are a new variety for the subsect. *Aristata* in sect. *Aristata* Godron (Snogerup, 1972; Snogerup and Snogerup, 2001).

Aristata is the second largest subsection of the section after subsect. *Juncea* (27 taxa) and includes a total of 11 taxa in Türkiye. Together with the new variety described here, the number of taxa of the *Aristata* subsection in Türkiye has risen to twelve (Snogerup, 1972; Duman, 2000; Snogerup and Snogerup, 2001).

2. Materials and Method

Specimens belonging to the new variety were collected in August from SE of Takmak Village in Tepebaşı District of Eskişehir Province in Türkiye. The related literature (Snogerup, 1972; Duman, 2000; Snogerup and Snogerup, 2001; Aksoy et al., 2011), the specimens in the high-resolution photographs in the B, C, E, FI, G, GB, H, JE, LD, M, P and PRC herbaria were utilized in the identification and evaluation of the specimens (Thiers, 2023). A Leica EZ4 stereo microscope and a Samsung A33 5G mobile telephone were used in the examination of the specimens and the taking of photographs, whereas a ruler with a sensitivity of 0.5 mm was used in the measurements.

2.1. Specimens examined

Bupleurum pendikum Snogerup. TÜRKİYE. [İstanbul] Constantinople. In collibus graminosis prope "Pendik", [8] Julio 1906, *G.V.Aznavour 5074* (M, M-0172797! [holotype]; LD, LD1075014; LD, LD1075078; JE, JE00006889; JE, JE00006890; C, C10008365; G,

G00367571; G, G00367575; G, G00367642; G, G00367647; B, B-10-0367149; E, E00000316; E, E00000317; GB, GB-0048804; GB, GB-0048805; FI, FI-014719; H, H1394748; PRC, PRC451949 [isotypes], virtual images); Kütahya, Keles-Tavşanlı, 36 km SE Keles, 1000 m, 07.07.1980, *M.Nydegger 15181* (E, E00091560; P, P06871068, virtual images); Kocaeli: Yuvacık dam area, Çilekli village, openings of *Pinus nigra* forest in steppe, 1089 m, 07.07.2006, *N.Aksoy 6324, A.Efe & N.Güneş* (DUOF 1125, fig. 1 in Aksoy et al., 2011).

3. Results

3.1. Taxonomic treatment

Bupleurum pendikum var. eskisehiricum Hamzaoğlu, **var. nov.** (sect. *Aristata*, subsect. *Aristata*).

Diagnosis: *Bupleurum pendikum* var. *eskisehiricum* is related to *B. pendikum*. It differs from *B. pendikum* (var. *pendikum*), mainly by rays (1–)2 pieces (not (2–)3–4(–5) pieces); bracteoles 2.6–3.7 mm broad, ovate-elliptic and with arista up to 0.5 mm long (not 1.2–2 mm broad, lanceolate and with arista 1–1.5 mm long); umbellules 9–15-floweted (not 6–8-flowered); petals 0.6–0.8 mm broad (not 0.4–0.5 mm broad); filaments 0.7–0.8 mm long (not c. 0.5 mm long); mericarps 2.7–3.1 × 1.1–1.3 mm (not 2.2–2.4 × 0.9–1 mm).

Type: TÜRKİYE. Eskişehir, Tepebaşı, SE of Takmak village, 930 m a.s.l., degraded oak and pine forest clearings, marly places, 29.08.2022, *E.Hamzaoğlu 8045* (holotype GAZI!, isotypes ANK!, HUB!).

Description: Annual, glabrous, (8–)15–40 cm, erect to ascending, densely pseudo-dichotomously branched from base to apex, with (5–)15–50(–70) umbels. Stem flexuous, terete, striate, up to 2 mm diameter at base, greenish above, purplish below. Leaves sessile, linear-subulate, acuminate; lower withered after anthesis; cauline 1.5–4.5 × 0.6–1.5 mm, with midrib and marginal vein. Peduncles 5–20(–30) mm, longer than longest rays. Rays (1–)2, very unequal, 2–11 mm long. Bracts 3(–4), 2/5 or more as long as longest ray, 4–5 mm long, elliptic-lanceolate, distinctly brownish 3-nerved with broad scarious margin, becoming ivory-white and ± semi-transparent. Bracteoles 5, exceeding the flowers and enclosing them before and after anthesis, ivory-white and semi-transparent, with entire margin, 4.5–7.1 × 2.6–3.7 mm, enlarging until ripening of fruits, ovate-elliptic, apiculate, arista up to 0.5 mm long, strongly brownish 3-veined, veinlets many, conspicuous, pinnate; after anthesis becoming semi-transparent throughout but as young herbaceous along the veins and in apical part. Umbellules 9–15-flowered, pedicels ± equal, 0.4–0.9 mm long. Petals milky whitish and semi-transparent, with brownish midrib, 0.9–1.3 × 0.6–0.8 mm, irregularly lobulate-dentate especially at apex, bend irregularly 4-lobed, inflexed lobe narrow, bifid. Stamen 1.0–1.2 mm long, anthers 0.4–0.5 mm long, filament 0.7–0.8 mm long. Stylopodium 0.5–0.8 mm broad, narrower than ripe fruit, styles 0.6–0.7 mm long, about equalling stylopodium radius. Ripe mericarps 2.7–3.1 × 1.1–1.3 mm, semi-circular in transect, dark brown to blackish, smooth, ridges filiform but in ripe fruit inconspicuous, oil ducts invisible.

Phenology: Flowering time July–August, fruiting time August–September.

Etymology: The type locality of the taxon, which is from Eskişehir, inspired the scientific name of the new variety (*Bupleurum pendikum* var. *eskisehiricum*).

3.2. Distribution and habitat

Specimens of *Bupleurum pendikum* var. *eskisehiricum* were collected from SE of Takmak Village (Tepebaşı, Eskişehir). It is estimated that the variety grows in marly places in degraded forest openings, approximately between 890 and 950 m a.s.l. There are many degraded forests and marly places around Eskişehir Province. The probability that the taxon is also grown in this places is rather high, but there is still no data about this. Consequently, at present, the taxon is an endemic of Türkiye and when the area of distribution is considered, it is an element of the Irano-Turanian phytogeographic region (Figure 1).

4. Discussions

4.1. Taxonomic notes

The first comprehensive information in Türkiye about the *Bupleurum* genus *Aristata* subsection was included in Volume 4 of the work titled *Flora of Turkey and the East Aegean Islands*, but as subsect. *Glumacea* (Boiss.) Wolff *Bupleurum sulphureum* is one of the 11 species of the subsection known from Türkiye and it is endemic. This species usually grows on calcareous steppes in Central Anatolia and its periphery (Snogerup, 1972). The work titled "*Bupleurum L. (Umbelliferae) in Europe – 1. The annuals, B. sect. Bupleurum and sect. Aristata*" prepared by Snogerup and Snogerup (2001), is a broad-scope study, which includes all the species of the *sect. Bupleurum* and

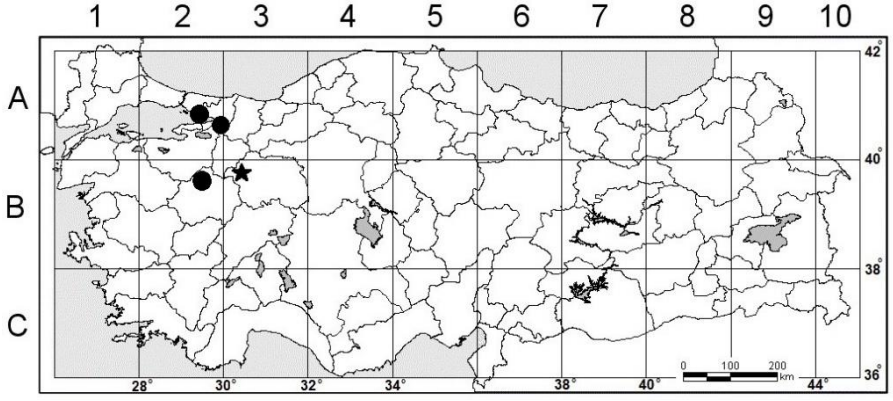

Figure 1. Distribution map of *Bupleurum pendikum* var. *eskisehiricum* (★) and *B. pendikum* (var. *pendikum*) (●).

Figure 2. *Bupleurum pendikum* var. *eskisehiricum*. A: habit (holotype), B: natural view of the umbel (with 2 rays)

Aristata sections in Europe (incl. Türkiye-in Europea, i.e. Thrace). In this study, a total of 14 species were given belonging to the subsect. *Aristata*.

The moment the *Bupleurum pendikum* var. *eskisehiricum* was seen for the first time, the most interesting aspect was that it was ivory-white bracteoles, very branched stems, and (1–)2-rayed inflorescences. When it is compared with the *Bupleurum pendikum* (var. *pendikum*) specimens, the most striking difference of the *B. pendikum* var. *eskisehiricum* variety were its few rayed inflorescences, ovate-elliptic bracteoles, very flowered umbellules, and larger mericarps (Figures 2 and 3, Table 1).

In the species belonging to the subsect. *Aristata* are bracteoles 1/3–2/3 as wide as long, enclosing the flowers before and after anthesis. Whitish bracteoles are encountered only in the *Bupleurum gracile* d'Urv., *B. aira* Snogerup, and *B. pendikum* in subsect. *Aristata* (Snogerup and Snogerup, 2001; Aksoy et al., 2011). *Bupleurum pendikum* var. *eskisehiricum* is similar to *B. pendikum* (var. *pendikum*) in terms of shape and size of bracts, shape and color of petals. However, in the *B. pendikum* var. *eskisehiricum* specimens, there are ovate-elliptic and 2.6–3.7 mm broad bracteoles, (1–)2-rayed inflorescences, 9–15-flowered umbellules, 0.6–0.8 mm broad petals, 0.7–0.8 mm long filamens, and 2.7–3.1 × 1.1–1.3 mm mericarps (Aksoy et al., 2011).

4.2. Conservation status

According to the existing data, *Bupleurum pendikum* var. *eskisehiricum* is a variety only known from the type locality. Approximately 300 individuals were counted in the type locality. The taxon grows dry marly places in oak and pine clearings in SE of Takmak Village. There are agricultural areas in the very close surroundings of the individuals belonging to the taxon. On the other hand, there

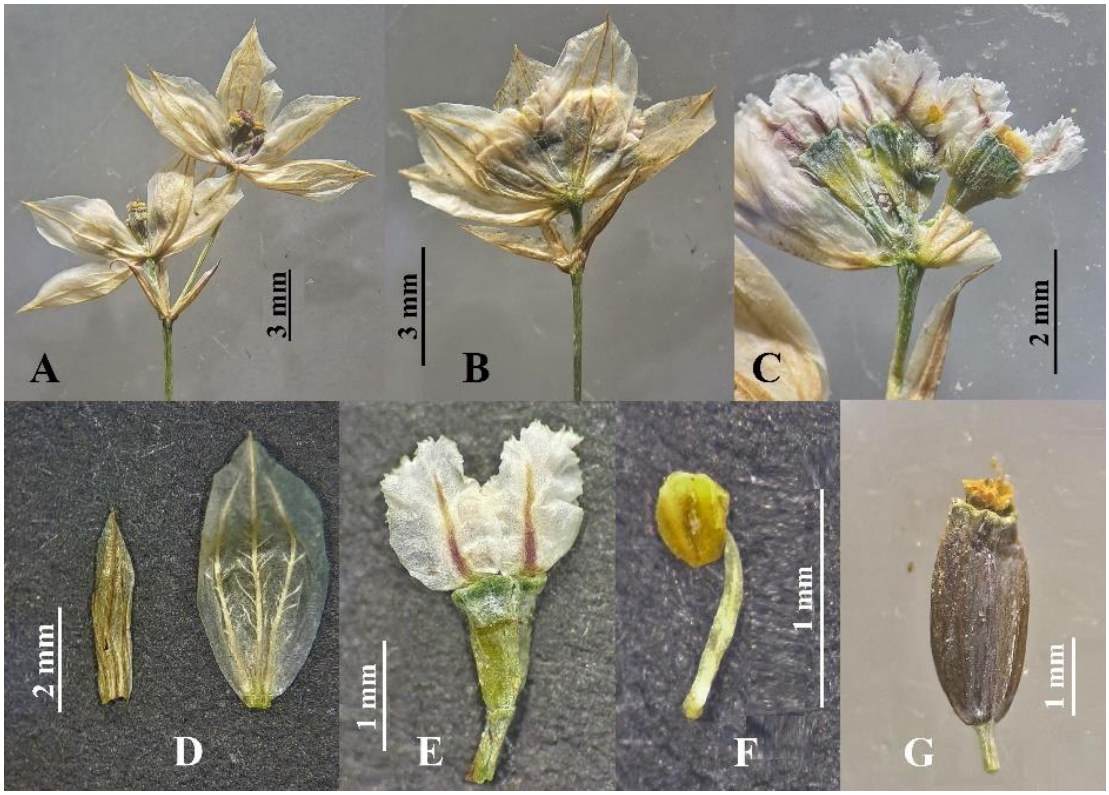

Figure 3. Inflorescence and flower parts of *Bupleurum pendikum* var. *eskisehirucum*. A: inflorescence with 2 rays, B: inflorescence with 1 ray, C: inside view of the inflorescence, D: bract (left) and bracteol (right), E: flower (ovary and petals), F: stamen (anther and filament), G: mericarp.

Table 1. Diagnostic characters of *Bupleurum pendikum* var. *eskisehiricum* and *B. pendikum* (var. *pendikum*).

Characters	***Bupleurum pendicum* var. *eskisehiricum***	***Bupleurum pendicum* (var. *pendicum*)**
Rays	(1–)2	(2–)3–4(–5)
Bracteoles	2.6–3.7 mm broad, ovate-elliptic and with arista up to 0.5 mm long	1.2–2 mm broad, lanceolate and with arista 1–1.5 mm long
Umbellules	9–15-flowered	6–8-flowered
Petals	0.6–0.8 mm broad	0.4–0.5 mm broad
Filaments	0.7–0.8 mm long	c. 0.5 mm long
Mericarps	2.7–3.1 × 1.1–1.3 mm	2.2–2.4 × 0.9–1 mm

is a very low probability of these areas becoming completely agricultural lands in the future. When the areas where the taxon could be grown are considered, it is estimated that *B. pendikum* var. *eskisehiricum* showed a distribution on an area smaller than 100 km^2. When the existing or envisaged threats are evaluated together, the taxon being known from only one address at present (area of life less than 10 km^2) and the breadth of the area of distribution calculated (less than 100 km^2), it was decided that it would be suitable to propose the Critically Endangered [CR B1ab(i)+CR B2b(ii)] classification for the extinction risk of the taxon (IUCN Standards and Petitions Committee, 2023).

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