KSÜ Tarım ve Doğa Derg 26 (5), 1048-1055, 2023
KSU J. Agric Nat 26 (5), 1048-1055, 2023
https://doi.org/10.18016/ksutarimdoga.vi. 1165944

Pimpinella major (Apiaceae); a New Record for the Flora of Türkiye and Contributions to Its Taxonomy

Lütfi BEHÇET[1], Hikmet CENGİZ[2]✉
[1]Bingöl University, Faculty of Science and Art, Department of Molecular Biology and Genetics, Bingöl, TÜRKİYE, [2]Bingöl University, Institute of Science, Bingöl, Department of Biology, Bingöl, TÜRKİYE
[1]https://orcid.org/0000-0001-8334-7816, [2]https://orcid.org/0000-0001-6788-0012
✉: cenghikmet@hotmail.com

ABSTRACT
In this study, the *Pimpinella major* (L.) Huds. (Apiaceae), which is distributed in Europe and mostly in the European part of Russia, recorded for the first time in Bingöl (Türkiye). The new record close to *P. saxifraga*, whose distribution is also known in Turkey; it differs from it in that its stem is hollow and angular-deeply furrowed (sulcate) and its ripe dried fruit is distinctly ridged. In addition, the characteristics of *P. major* samples collected from Bingöl were compared with the known diagnostic features of this species and some differences (variations) were emphasized.

Botany

Research Article

Article History
Received : 23.08.2022
Accepted : 27.12.2022

Keywords
Pimpinella major
Apiaceae
New record
Variation
Bingöl/Türkiye

Pimpinella major (Apiaceae); Türkiye Florası İçin Yeni Bir Kayıt ve Bu Taksonun Taksonomisine Katkılar

ÖZET
Bu çalışmada, Avrupa'da ve çoğunlukla Rusya'nın Avrupa kısmında yayılış gösteren *Pimpinella major* (L.) Huds. (Apiaceae) türü ilk kez Bingöl (Türkiye)'den kaydedilmiştir. Türkiye'de de dağılımı bilinen *P. saxifraga*'ya yakın olan bu tür; gövdesinin içi boş, köşeli-derin oluklu (sulkat) olması ve olgun kuru meyvelerinin belirgin çıkıntılara sahip olması ile ondan farklıdır. Ayrıca Bingöl'den toplanan *P. major* örneklerinin özellikleri bu türün bilinen tanısal özellikleri ile karşılaştırılmış ve bazı farklılıklar (varyasyonlar) üzerinde durulmuştur.

Botanik

Araştırma Makalesi

Makale Tarihçesi
Geliş Tarihi : 23.08.2022
Kabul Tarihi : 27.12.2022

Anahtar Kelimeler
Pimpinella major
Apiaceae
Yeni kayıt
Varyasyon
Bingöl/Türkiye

Atıf Şekli: Behçet, L., & Cengiz, H., (2023) *Pimpinella major* (Apiaceae); Türkiye Florası İçin Yeni Bir Kayıt ve Bu Taksonun Taksonomisine Katkılar. *KSÜ Tarım ve Doğa Derg 26* (5), 1048-1055. https://doi.org/10.18016/ksutarimdoga.vi.1165944

To Cite : Behçet, L., & Cengiz, H., (2023). *Pimpinella major* (Apiaceae); a New Record for the Flora of Türkiye and Contributions to Its Taxonomy. *KSU J. Agric Nat 26* (5), 1048-1055. https://doi.org/10.18016/ ksutarimdoga. vi.1165944

INTRODUCTION
Some parts of the world have been studied in detail from a floristic point of view, and the flora of these areas has been revealed in full or with little incompleteness (Mirek et al. 2015). Such well-studied countries are generally not very wide and the land is not very rugged. Türkiye has a very rich flora due to its geographical location, climatic diversity and rugged terrain. However, it cannot be said that this diversity of Turkey has been fully determined today. The publication of many new vascular plant taxa and new records from Türkiye every year is proof of this claim.

Bingöl can be evaluated among the provinces whose flora is well known, with recent floristic studies (Behçet & İlçim 2015; Doğan et al. 2015; Duran et al. 2015; Çinbilgel et al. 2016; İlçim & Behçet 2016; Behçet et al. 2017; Behçet & Yapar 2020, 2021; Hamzaoğlu et al. 2020; Sinan et al. 2021), a new record for Turkey (Pınar et al. 2018) and an interesting distribution of a lost endemic taxon (Behçet & Yapar

2019) have been published. These publications reveal that the floristic richness of Bingöl is known enough well.

During the floristic researches, the second author collected interesting Apiaceae specimens from the surroundings of Güzgülü village (Yedisu, Bingöl/Türkiye). These specimens could not be identified using the Flora of Türkiye account (Matthews 1972; Davis et al. 1988; Güner et al. 2000). Eventually, specimens were identified as *Pimpinella major* (L.) Huds. using the generic account in Flora Europaea volume 4 (Tutin 1968) and Flora of the USSR volume 16 (Shishkin 1973), it was a new record for the Flora of Türkiye.

As a result of the changing ecology, plant species can show some morphological adaptations according to their environment (Table 1). This Apiaceae member, whose distribution was collected from a location far away from previously known regions (in eastern Türkiye) (Figure 1), also shows some variations due to the changing ecology.

Table 1. Comparison of some morphological features of *Pimpinella major* collected from Bingöl with the descriptions of this species in Russian and European floras and *P. saxifraga* features

Çizelge 1. Bingöl'den toplanan Pimpinella major'un bazı morfolojik özelliklerinin Rusya ve Avrupa floralarında yer alan bu türün tanımları ile ve P. saxifraga özellikleri ile karşılaştırılması

Characters	Flora of the USSR (Shishkin 1973)	Flora Europaea (Tutin 1968)	Examples examined in this study	*Pimpinella saxifraga* (Shishkin 1973; Tutin 1968; Matthews 1972)
Stem	40 - 100 cm high, straight, hollow, deeply furrowed, glabrous, with clusters of leaves at base	up to 100 cm, glabrous or rarely puberulent, deeply sulcate (very rarely terete), hollow, branched above	**80 – 140 cm** high, sulcate, hollow, **the lower parts retrorsely puberulent, above parts glabrous**	**15-60 cm, cylindrical, almost or quite solid usually terete, thinly ribbed**
Lower leaves	Lower leaves petioled, simple-pinnate, with **2-4** pairs of ovate or oblong, **2.5-7 x 1-4 cm,** cuneate acute or acuminate, rounded or slightly cordate, unequally acute- or incised-dentate **leaflets, with scabrous margins**	Lower leaves 1(-3)-pinnate with **3-9 segments**; **segments up to 100 mm long**, ovate or oblong, dentate, rarely pinnatisect	**Basal leaves 25 - 60 cm long (including petiol)**, 1-pinnat; **petiole 1,5-3 cm dilated at the base and retrorsely puberulent,11 – 41 cm long, with 7-11 segments; segments up to 65 x 50 mm,** ovate, depply dentate, lobed, rarely pinnatisect, **sparsely hairy on lower surface, glabrous above;** rounded, slightly cordate or cuneate at the base,	with rosette of radical leaves leafy only in lower part, basal leaves 5-20 cm long, almost leafless above
Cauline leaves		Cauline leaves smaller, with inflated, sheath-like petioles with membranous margins	**Lower and median cauline leaves 12-36 cm long,** 1-2 pinnate, with 9-13 segments; segments upto 45x35 mm, pinnatisected, and **lowest segments with 2-4 mm long petiolule; petiole 25- 105 mm long, 20-35 mm long part of the petiole base has a sheath (white scarious edge) structure**	Cauline leaves much reduced, median cauline leaves with cuneate leaflets more deeply cut into narrow lobes at base, nearly pinnate, sessile on sheaths;
Upper leaves				
Uppermost leaves	**Upper leaves sessile, terminal leaflets 3-lobed or 3-partite, median and upper cauline leaves sessile on dilated sheath with white scarious margin,**	Pinnately divided, lobes few	**Upper cauline leaves** sessile on dilated sheath , with narrower , more	upper leaves with simple pinnate or 3-partite small blade with lanceolate or sublinear lobes;

	leaflets narrower, more deeply dissected uppermost leaves small, trifid or obsolete		deeply dissected, trisect **Uppermost leaves** small, trifide, sessile on inflated sheath 10-20 mm long	uppermost leaves with reduced blad
Bracts and bracteoles	Involucre (bracts) and involucels (bracteols) usually absent	Bracts absent; bracteoles usually absent, rarely few, caducous	Bracts – bracteoles absent, or rarely bract 1	
Ray numbers in an umbel, ray length and indumentum, per umbellule flower number	**9—15**, thin, **glabrous**	**10-25**, slender.	**13-31**, 1.5-3.5 cm long, glabrous **or sparsely hairy**, **19-24 flowered per umbellule**	**5-25,** thin,glabrous, **10-20 flowered per umbellule**
Petal	white or **pink,** the outer ca.1.4 mm long	white to **deep pink**	**white**, 1-1.5 x 0.9-1.1 mm, **puberulent or with pointed papillae on back**	white, rarely pink, ca. 1 mm long, bristly-hairy on back,
Fruits	Fruit glabrous, oblong-ovoid, 2.5-3.5 x 1.5-2 mm, dorsal ribs prominent, styles 1.5-2 mm long	Fruit 2.5-3.5 mm long, ovoid-oblong; ridges prominent, whitish	**2.3-3** x 1.5-2.1 mm, **oblong-ovoid**, glabrous, ridges prominent, whitish (Figure 5)**, styles 1.5-1.6 mm long**	2 —2.5 x 1.5-2 mm **brodly ovoid, ridges inconspicuous, styles not exceeding 1 mm**
Stamen	--	--	Anther 1-1.2 mm long, filament 3 mm long	

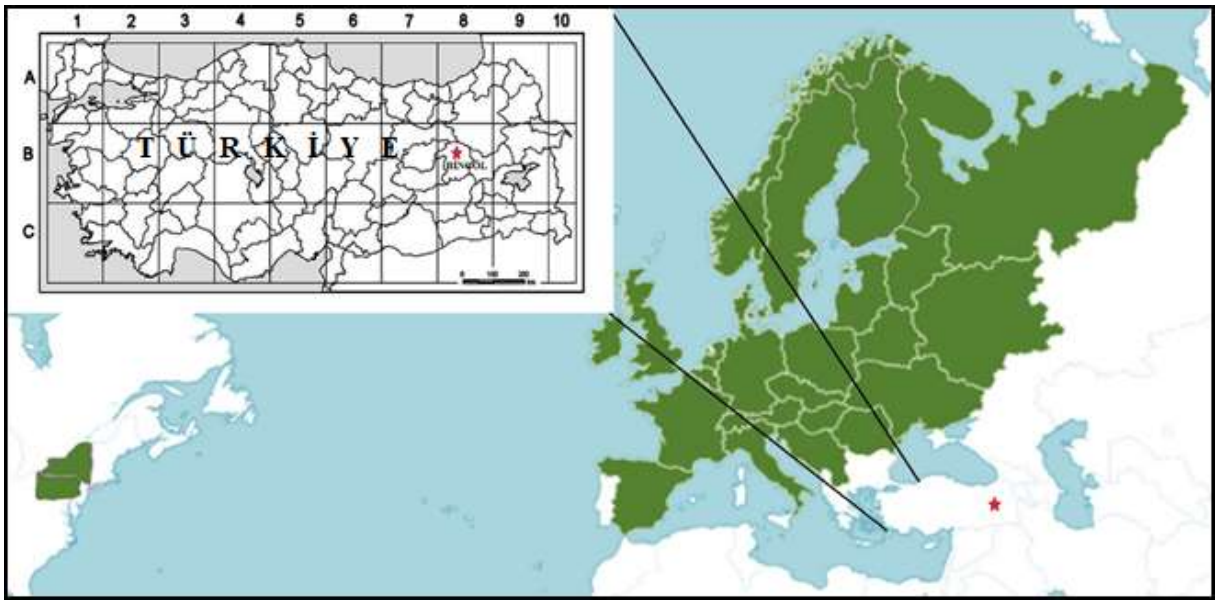

Figure 1. Distribution map of *Pimpinella major* in the World (■) (from POWO 2022) and Türkiye (★)
Şekil 1. Pimpinella major'un Dünya (■) ve Türkiye'deki (★)yayılış haritası (POWO 2022'den)

The genus *Pimpinella* L. (Apiaceae) which contains approximately 150-170 species in the world, has 32 taxa (22 species, 5 subspecies and 5 varieties) distributed in Türkiye and 8 of them are endemic (Pimenov & Leonov 1993; Pu & Watson 2005; Menemen 2012; Fırat 2019). With this new rerecord, the number of *Pimpinella* members has increased to

33. The habitats of the members of the genus are variable; there are members that can develop in different habitats from arid rocky areas to moist-aquatic places (Tutin 1968; Matthews 1972; Pignatti 1982; Hartvig 1986; Velayos 2003; Menemen 2012; Yeşil et al. 2016). In this study, *Pimpinella major* is reported as a newly founded taxon Türkiye. In addition, we provide its description of morphological characters, illustrations and photographs of *P. major* and a key to allied taxa in Türkiye.

MATERIALS and METHODS

Specimens of *Pimpinella major* (Figure 2-5) were collected from Yedisu (Bingöl/Türkiye) (Figure 1) in June 2020 and June 2021. The specimens were identified using keys to the genus *Pimpinella* in volume 4 of Flora Europaea (Tutin 1968) and volume 16 of Flora of the USSR (Shishkin 1973). A detailed morphological study of *P. major* was undertaken based on fresh and dried material. The morphological characteristics of *P. major* with the descriptions given in the floras of Europe (Tutin 1968) and the USSR (Shishkin 1973) were compared with the characteristics of the samples collected from Bingöl and some differences were revealed. Collected materials are deposited at the Herbarium of Bingöl University, Arts and Science Faculty (BIN) and ANK.

RESULTS and DISCUSSION

Pimpinella major (L.) Hudson Fl. Angl. ed. 1 (1762) 110; Mill. Gard. Diet, ed. VIII (1768) No.l; Wolff in Engl. Pflanzenr. IV, 228(1927)289. (Figure 2-5).

Syn: =*Pimpinella saxifraga* var. *major* L. Sp. pi. (1753) 264. =*P. magna* L. Mant. 11(1771)217; Ldb. Fl. Ross. II, 254; Shmal'g., Fl. I, 393. =*P. austriaca* Mill. Gard. Diet. ed. VIII (1768) No. 5. =*P. orientalis* Gouan Illustr. (1773) 21.=*P. media* Weber in Wigg. Prim. Fl. Holsat. (1782) 26.- =*P. angustifolia* Gilib. Fl. lithuan. 11(1782)42. =*P. rubra* Hoppe et Schleich. ex Spreng. in Schult. Syst. Veg. VI (1 820) 384. =*P. tenuifolia* Schwaegr. et Koerte ex Steud. Nomencl. ed. II, 2 (1841) 335. =*P. rugosa* Kunze in Flora, XXIX (1846) 654. ≡*Tragoselinum majus* Lam. Fl. Franc. 111(1778)448. = *T. magnum* Moench, Meth. (1794)99. =*Carum magnum* Baill. Hist. PI. VII (1 880) 178. =*Apium pimpinella* Car. in Pari. Fl. ital. VIII (1 889) 452. - Ic: Rchb. fil. XVII, tab. 27.- Exs.: G.R.F. No. 2634; PI. Finl. exs. No. 830; E. Woloszczak, Fl. polon. exs. No. 728.

Figure 2. *Pimpinella major* **a**- habit, **b**-root, **c**- close-up view of the stem, **d**- appearance of hollow and sulcate structure in the cross section of the stem

Şekil 2. Pimpinella major a- genel görünüm, b-kök, c- gövdenin yakından görünümü, d- gövdenin enine kesitinde içi boş ve oluk yapının görünümü

Figure 3. Basal (A), lower (B) and median cauline (C,D) leaves view of *Pimpinella major* collected from Türkiye
Şekil 3. Türkiyeden toplanan Pimpinella major'un Bazal (A), alt (B) ve orta gövde yapraklarının (C,D) görünümü

Description: Perennial. **Root** fusiform. **Stem** 40–140 cm high, hollow, deeply sulcate, retrorsely puberulent (glabrous at above), branched above, with clusters of leaves at base. **Basal leaves** 25 – 60 cm long (incl. petiole), 1(–3) pinnate; with 3–11 leaflets; leaflets up to 65 x 50 mm, ovate, deeply dentate, lobed, rarely pinnatisect, rounded, slightly cordate or cuneate at the base, sparsely hairy on the lower surface, glabrous above and with scabrous margin; petiole 11 – 41 cm long, 1.5-3 cm dilated at the base and retrorsely puberulent. **Lower cauline leaves** 12–36 cm long (incl. petiole and sheath), 1–2 pinnate, with 9–13 segments; segments up to 45 x 35 mm, pinnatisect, and lowest segments with 2–4 mm long petiolule, the 20–35 mm part of the 25–105 mm long petiole has formed a sheath (with scarious white edges). **Median and upper cauline leaves** sessile on dilated sheath with white scarious margin, leaflets narrower, more deeply dissected. **Uppermost leaves** small, trifid or obsolete, terminal leaflets small, 3-lobed or 3–partite, sessile on the inflated sheath 10–20 mm long. **Umbels** of 9–31 thin glabrous or sparsely hairy rays; rays 1.5-3.5 cm long, subequal, per ray 19-24 flowered, bract and bracteole usually absent, rarely bract one. **Pedicels** scabrid, 4–6 mm long. **Petals** white to deep pink, puberulent or with pointed papillae on back (the specimens in Türkiye are white and puberulent), the outer 1–1.5 x 0.9–1.1 mm. **Anthers** 1–1.2 mm and filament 3 mm long. **Fruit** oblong-ovoid, glabrous, 2.3–3.5 x 1.5–2.1 mm, dorsal ribs protruding, canals 4 under valleculae, 4 toward commissure, styles 1.4–1.6 mm long, stylopodium mamillate-depressed. 2n= 20.

Flowering: June–July, **Fruiting:** June–August

Distribution: Europea and Türkiye (POWO 2022) (Figure 1).

Type: 373.14 (LINN, lectotype, designated here by J.-P. Reduron) (Jonsell & Jarvis 2002).

Specimens examined: Türkiye B8 square, Bingöl: Yedisu town, Güzgülü village, stream sides- damp slopes 1518 m, 39°25'36.50"N, 40°29'15.98"E, 24.06.2020, *Hikmet Cengiz* 2860; ibid, 30.06.2020, *Hikmet Cengiz* 2915; ibid, 22.06.2021, *Hikmet Cengiz* 3719.

Ecology: Specimens of this new record for Türkiye were collected by the second author from the humid slopes 1500-1600 meters around Güzgülü village of Yedisu town of Bingöl. The climax vegetation of Güzgülü village and its surroundings is composed of oak forests (*Quercus petraea* (Matt.) Liebl. subsp. *pinnatiloba* (K.Koch) Menitsky and *Q. libani*

Figure 4. Views of leaf morphology and change in size from the lower part to the tip (1-8) of the stem of *Pimpinella major*

Şekil 4. Pimpinella major gövdesinin alt kısmından yukarıya (1-8) doğru yaprak morfolojisi ve boyut değişiminin görünümleri

G.Olivier taxa are the dominant). Oak species in places; woody shrub members of *Crataegus* L, *Lonicera* L., *Sorbus* L., *Rosa* L. genera are included. The covers of cultivated plants such as *Salix alba* L. and *Populus alba* L. also draw attention along the streams. Taxa such as *Atriplex laevis* Ledeb., *Bidens tripartita* L., *Bunium simplex* (K.Koch) Klyuikov, *Epilobium hirsutum* L., *Eremurus spectabilis* M.Bieb., *Chaerophyllum bulbosum* L., *Cirsium macrobotrys* (K.Koch) Boiss., *Cucubalus baccifer* L., *Gentiana cruciata* L., *Geranium divaricatum* Ehrh., *Inula salicina* L., *Juncus atratus* Krock., *Lepidium latifolium* L., *Lathyrus pratensis* L., *L. rotundifolius* Willd. subsp. *miniatus* (M.Bieb. ex Steven) P.H.Davis, *Lithospermum arvense* L., *Lycopus exaltatus* L. , *Medicago lupulina* L., *Melissa officinalis* L. subsp. o*fficinalis, Pastinaca sativa* L. subsp. *urens* (Req. Ex Gren. & Godr.) Čelak., *Phleum pratense* L., *P. tuberosa* L., *Poa trivialis* L., *Polygonatum orientale* Desf., *Potentilla recta* L., *Senecio mollis* Willd., *Sium sisarum* L. var. *lancifolium* (M.Bieb.) Thell., *Scutellaria galericulata* L. *Tragopogon albinervis* Freyn & Sint., *Silene vulgaris* (Moench) Garcke subsp. *commutata* (Guss.) Hayek, *Stachys setifera* C.A.Mey. subsp. *lycia* (Gand.) R.Bhattacharjee, *S. spectabilis* Choisy ex DC. *Trifolium pratense* L. var. *americanum* Harz., *Verbena officinalis* L. and *Vicia sativa* L. subsp. *nigra* (L.) Ehrh. var. *nigra*, which generally prefer humid-aquatic environments, participate in important species that develop together with the *Pimpinella major*.

Pimpinella major specimens (Figure 2,5) were collected from Bingöl in June 2020-2021. This taxon has a large size compared to other *Pimpinella* taxa of Türkiye. *P. major* morphologically resembles *P. saxifraga.* However, the deeply sulcate structure on the stem of the plant and the hollow feature seen in the stem cross-sections (Fig. 2c and d) and its ripe dried fruit is distinctly ridged (Fig. 5c) confirmed the idea that this plant could not be *P. saxifraga.* Because in the *Pimpinella* keys in the relevant volumes of the European (Tutin 1968) and USSR (Shishkin 1973) floras; the flowers are white (not yellow), the fruits are glabrous and the stems are sulcate and the hollow *Pimpinella* species is *P. major*.

Figure 5. Umbel views of *Pimpinella major* in flower (A) and fruit (B) periods and ridged fruit image(C)

Şekil 5. Pimpinella major'un çiçek (A), *meyve* (B) *dönemlerine ait umbel görünümleri ve damarlı meyve (C) görüntüsü*

When the characteristics of *Pimpinella major* specimens collected from Bingöl and the descriptions given in European and Russian floras are compared; Some variations due to ecology have been detected in plant height, indumentum, leaf characteristics, number of rays and lengths and these are given in the Table 1.

Considering the leaf structures of *P. major* from the basal to the upper part of the stem, it is seen that there is a lot of variability and structural difference. This much variability in the leaf morphology of the plant we collected from Türkiye does not take place sufficiently in European and USSR floras. For example, although the basal leaves of *P. major* are up to 60 cm long (incl. petiol) and the base of the petiole is 2-3.5 cm wide (not in scarious sheath structure with white margin), the leaves on the stem have a different structure (Figure 3, Table 1). However, the caulin leaves of this species are quite different from the basal leaf in terms of both structure and size. The lower cauline leaves are smaller than the basal leaves; They both carry a petiole (non-sheath shape) and a wide scarious sheath with white margins on the lower part. The leaflets in the basal leaf do not have petiolules; they are less dissected (Figure 3).

When the leaf structure features from the lower parts of the plant stem to the top are examined, there is a significant reduction in size from the bottom to the top; there are also quite a lot of variations in structural features (Table 1). While the leaves in the lower and middle parts of the stem carry both sheath and petiole; the leaves above bear sheath only (Figure 3,4). The leaflets on the lower leaves are less dissected than the leaflets on the upper leaves, and the number of segments is larger. In addition, the petiolule structure, which is not seen in the leaflets of basal leaves, is generally evident in cauline leaves.

Although the definition of this taxon prepared according to the samples collected from the distribution areas of *Pimpinella major* outside Türkiye (such as Europe and Russia) and the P*. major* samples collected from Bingöl show some differences (Table 1); In addition to its fruit structure dimensions, it also complies with the aforementioned definitions with its hollow and sulcate stems.

Today, the genus *Pimpinella* is represented in Türkiye by a total of 33 taxa (with the addition of *P. major*), 23 species (8 of which are endemic to Türkiye), 5 subspecies and 5 varieties.

Recommended diagnostic key:

- Stem deeply sulcate, hollow, up to 140 cm long, ridges of fruit prominent, styles 1.5-1.6 mm long…… ***P. major***

- Stem cylindrical, thinly ribbed, almost or quite solid, 15-60 cm long, ridges of fruit inconspicuous, styles not exceeding 1 mm …….. ***P. saxifraga***

Author's Contributions

The contribution of the authors is equal.

Statement of Conflict of Interest

Authors have declared no conflict of interest.

REFERENCES

Behçet, L., İlçim., A. & Yapar, Y. (2017). *Centaurea bingoelensis* (Asteraceae), a new species from Turkey. *Turkish Journal of Botany 41*, 180-188.

Behçet, L. & Yapar, Y. (2019). Rediscovery of the lost endemic *Micromeria cymuligera* (Lamiaceae) in Eastern Anatolia-Turkey. *Nordic Journal of Botany*. 37.

Behçet, L. & Yapar, Y. (2020). *Lactuca anatolica* (Asteraceae: Lactucinae), a new species from eastern Anatolia (Turkey). *Phytotaxa 455(4)*, 287–294.

Behçet, L. & İlçim, A. (2015). *Paracaryum bingoelianum* (Boraginaceae), a new species from Turkey. *Turkish Journal of Botany 39*, 334-340.

Behçet, L. & Yapar, Y. (2021). *Bromus orientalis* (Poaceae: *B.* sect. *Bromopsis),* a new species from Turkey. *Nordic Journal of Botany 39*(4), 1-7.

Çinbilgel, İ., Eren, Ö., Duman, H. & Gökçeoğlu, M. (2016) *Pimpinella ibradiensis* (Apiaceae), an unusual new species from Turkey. *Phytotaxa 217*, 164–172.

Davis, P.H., Mill, R. R. & Tan, K. (1988). Flora of Turkey and The East Aegean Islands (Supplement), Edinburgh University Press, Vol. 10, Edinburgh.

Doğan, M., Behçet, L.& Sinan, A. (2015) *Pseudophleum anatolicum*, a New Endemic Species of Pseudophleum (Poaceae) from East Anatolia, *Turkey. Systematic Botany* (Published by: *The American Society of Plant Taxonomy*) *40*(2), 454-460

Duran, A., Behçet, L. & Öztürk, M. (2015). *Diplotaenia bingolensis* (Apiaceae), new species from east Anatolia, Turkey. *Plant Systematics and Evolution, 301*(1), 467-478.

Fırat, M. (2019). *Pimpinella kurdica* (Apiaceae), a new record for the flora of Turkey. *Iranian Journal of Botany 25*(2), 123-126. Tehran.

Güner, A., Özhatay, N., Ekim, T. & Başer, K.H.C. (2000). Flora of Turkey and the East Aegean Islands, vol. 11. Edinburgh University Press, Edinburgh, pp. 503.

Hamzaoğlu, E., Behçet, L. & Yapar, Y. (2020). A New Suffruticose Taxon of *Dianthus* (Caryophyllaceae) from Bingöl, Turkey . *KSU J. Agric Nat 23* (6), 529-534.

Hartvig, P. (1986). *Pimpinella* L. In: A. Strid, Mountain flora of Greece 1, Cambridge University Press, Cambridge. pp. 677–680.

İlçim A, Behçet L, 2016. *Astragalus topalanense* (Fabaceae), a new species from Turkey. *Turkish Journal of Botany* 40(1), 74-80.

Jonsell, B. & Jarvis, C. E. (2002). Lectotypification of Linnaean names for Flora Nordica (Brassicaceae - Apiaceae). *Nordic Journal of Botany 22*, 67-86. Copenhagen.

Matthews, V. A. (1972). *Pimpinella* L. In: Davis, P. H. (ed.), Flora of Turkey and the East Aegean Islands Vol. 4: Edinburgh Univ. Press, Edinburgh. pp. 352–364.

Menemen, Y. (2012). *Pimpinella* L. In: Güner, A., Aslan, S., Ekim, T., Vural, M. & Babaç, M.T., (eds). Türkiye Bitkileri Listesi (Damarlı Bitkiler). - Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul. pp. 73-75.

Mirek, Z., Nikel, A. & Wilk, L. (2015). *Coronilla vaginalis* – a species new for the flora of Poland. *Acta Societatis Botanicorum Poloniae 84*(1), 133–138.

Pınar, S. M., Fidan, M., Behçet, L. & Eroğlu, H. (2018). A New Record for The Flora of Turkey: Onopordum cinereum Grossh. (Asteraceae). *Erzincan University Journal of Science and Technology 11*(1), 85-91.

Pignatti S. (1982). Flora d'Italia 2. Edagricole, Bologna.

Pimenov, M.G. & Leonov, M.V. (1993). Genera of the Umbelliferae. Royal Botanic Gardens, Kew, pp. 156.

POWO, (2022). Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet: http://www.plantsoftheworldonline.org/ (Access: 18.08.2022).

Pu, F. & Watson, M.F. (2005). *Pimpinella*. In Flora of China. Vol. 14. Wu, Z. Y., P. H. Raven and D. Y. Hong (eds.), Science Press, Beijing and Missouri Botanical Garden Press, St. Louis, MO. pp. 93–104.

Shishkin, B.K. (1973). *Pimpinella* L. In: Komarov VL (ed). Flora of the USSR. Vol. XVI Moscow: Bishen Singh Mahendra Pal Singh and Koeltz Scientific Books (English translation): pp. 305-321.

Sinan, A., Behçet, L. & Yapar, Y. (2021). *Ranunculus solhanensis* (Ranunculaceae), a new species from eastern Turkey. *Phytotaxa 497*(2), 157–164.

Tutin, T. G. (1968). *Pimpinella* L. -In: Tutin TG, Heywood VH, Burges NA, Moore DM, Valentine DH, Walters SM, Webb DA (eds.), Flora Europaea Vol. 2: Cambridge Univ. Press, Cambridge, pp. 331–333.

Velayos, M. (2003). *Pimpinella* L. In: S. Castroviejo,G. Nieto Feliner, S. L. Jury, A. Herrero (eds.), Flora Iberica 10. -*Real Jardín Botánico*, Madrid. pp. 181–191.

Yeşil, Y., Yıldırım, H., Akalın, E., Pirhan, A. F. & Altıoğlu, Y. (2016) *Pimpinella enguezekensis* (Apiaceae), a new species from East Anatolia Region (Turkey). *Phytotaxa 289*(3), 237 -246.