Rostaniha 23(2): 293–299 (2022) – Short Article

رستنیها ۲۳(۲): ۲۹۹–۲۹۳ (۱۴۰۱) – مقاله کوتاه

DOI: 10.22092/BOT.J.IRAN.2022.360477.1330

Cnidiocarpa physospermifolia, a new record for the flora of Iran

Received: 07.11.2022 / Accepted: 14.12.2022

Mahmoud Bidarlord✉: Research Assistant Prof., Guilan Agricultural and Natural Resources Research and Education Center, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran (m.bidarlord@areeo.ac.ir)

Dmitry Lyskov: Researcher, Department of Higher Plants, Faculty of Biology, Lomonosov Moscow State University, 1-12 Leninskie Gory, 119234, Moscow, Russia

Abstract

Cnidiocapra consists of five species that are distributed in the Caucasus, Southwest Asia, and Central Asia. Up to now, only one species of this genus, namely, *C. alata*, is known in Iran. During the floristic study of the Aq-Dagh Protected Area (south of Ardabil province, Iran), *C. physospermifolia* another species of this genus was observed and identified from the subalpine wetland. This species is characterized by striated stems, 2-ternate leaves, absent or one linear bract, scabrous and unequal rays, and 4–6 commissural vittae. This paper provides the description, and diagnostic images of the plant along with its distribution. The identification key for *Cnidiocapra* species is also presented.

Keywords: *Apiaceae*, *Ligusticum*, new locality, *Selineae*, *Selinum*, *Umbelliferae*

Cnidiocarpa physospermifolia، گزارشی جدید برای فلور ایران

دریافت: ۱۴۰۱/۰۸/۱۶ / پذیرش: ۱۴۰۱/۰۹/۲۳

محمود بیدارلرد✉: استادیار پژوهش بخش تحقیقات جنگل‌ها، مراتع و آبخیزداری، مرکز تحقیقات و آموزش کشاورزی و منابع طبیعی استان گیلان، سازمان تحقیقات، آموزش و ترویج کشاورزی (AREEO)، رشت، ایران (m.bidarlord@areeo.ac.ir)

دِمیتری لیسکوف: پژوهشگر گروه گیاهان عالی، دانشکده زیست‌شناسی، دانشگاه دولتی لومونوسوف مسکو، لنینسکی گوری، ۱۱۹۲۳۴، مسکو، روسیه

خلاصه

جنس *Cnidiocarpa* Pimenov (چتریان) با پنج گونه، در جنوب غربی آسیا، قفقاز تا آسیای میانه پراکنش دارد. تا کنون در ایران از این جنس تنها گونه *C. alata* شناخته شده است، اما طی مطالعه فلورستیک منطقه حفاظت شده آق‌داغ واقع در جنوب استان اردبیل، از مانداب‌های نیمه‌آلپی، گونه‌ای دیگر از این جنس با نام *C. physospermifolia* مشاهده و مورد شناسایی قرار گرفت. این گونه با ساقه ایستاده، شیاردار، برگ‌های دوبار سه‌بخشی، بدون برگه و یا با یک برگه خطی نازک، شعاع‌های چتر زبر و نابرابر و ۶-۴ کانال هدایت شیرابه درون مریکارپ قابل تشخیص بود. در گزارش حاضر، علاوه بر شرح گیاه، تصاویر تشخیصی، زیستگاه، صفات متمایزکننده از گونه موجود در ایران و کلید شناسایی برای همه گونه‌های جنس *Cnidiocarpa* ارایه می‌شود (شکل‌های ۱ و ۲).

واژه‌های کلیدی: تیره جعفری، چتریان، محل رویش جدید، *Ligusticum*، *Selineae*، *Selinum*

Introduction

Ligusticum L. alliance is one of the most complicated taxa with regard to the generic treatment within the *Apiaceae* family. Molecular comparative studies show that, this alliance is an extremely non-monophyletic group (Spalik *et al.* 2004, Valiejo-Roman *et al*. 2006). From this point of view, this group has been classified into 25 separate genera (Pimenov 1983, 2018, Plunkett *et al.* 2018, Ostroumova *et al*. 2019). Although, some literatures have used a broad sense of *Ligusticum* (Pu & Watson 2005, Sun *et al*. 2008, Ren *et al.* 2022), authors have followed Plunkett *et al*. (2018) and Ostroumova *et al*. (2019) approaches, as in its narrow sense.

The genus *Cnidiocapra* Pimenov (1983) belongs to *Ligusticum* alliance. It was described on the basis of *C. alaica* Pimenov. *Cnidiocapra* includes five species, namely, *C. alaica* Pimenov from the Pamiro-Alay Mountains, *C. coniifolia* (Boiss.) Pimenov from Turkey and the Caucasus, *C. alata* (M. Bieb.) Pimenov *et* Kljuykov from the Caucasus, Eastern Turkey and Iran, and *C. physospermifolia* and *C. rhodopetala* Pimenov *et* Kljuykov from the Caucasus. Therefore, the Caucasus is considered as a center of diversity for *Cnidiocapra* (Ostroumova *et al*. 2019). This genus is characterized by its horizontal rhizomes, hollow stems and petioles at cross section, sheaths of stem leaves often inflated; leaves 2–3-pinnatisect, broad-triangular to triangular-ovate; leaflets ovate, deeply serrate or lobate; mericarps with 1–3 vallecular vittae and 2–6 commissural vittae. It is worth mentioning that, *Cnidiocapra* has closely related to *Selinum* and *Katapsuxis* (Hand 2011, Plunkett *et al*. 2018, Ostroumova *et al*. 2019).

Materials and Methods

During field expedition to Aq-dagh Protected Area, south of Ardabil province (Iran), an interesting specimen was observed. The complete specimens were collected and photographed during Aug.–Sept. 2022. The collected plants were deposited in the GILAN herbarium (acronyms according to Thiers 2022). The relevant environmental data were also recorded *in situ*. The specimens were studied with various Floras and relevant literature (Linczevski 1950, Tamamshian 1967, Tutin 1968, Hedge & Lamond 1972, Rechinger 1987, Pu & Watson 2005, Mozaffarian 2007, Ostroumova *et al*. 2019) also were compared with materials from E, K, M, MW, P, and W herbaria (acronyms according to Thiers 2022). The result indicated that, the collected plant is *Cnidiocapra physospermifolium* which is a new report to the Iranian flora. Worldwide geographical distribution was examined with Ostroumova *et al.* (2019) and The Global Biodiversity Information Facility (GBIF 2022).

Results

Cnidiocarpa physospermifolia (Albov) Pimenov in Bot. Zhurn. 90: 254 (2005) (Figs 1 & 2)

Syn. *Ligusticum physospermifolium* Albov in Prodr. Fl. Colch.: 109 (1895); *Macrosciadium physospermifolium* (Albov) V.N.Tikhom. & Lavrova in Byull. Moskovsk. Obšč. Isp. Prir. Otd. Biol. 93(6): 64 (1988); *Selinum physospermifolium* (Albov) Hand. in Willdenowia 41(2): 249 (2011)

Type: Georgia, Abchasia, m. Mamdzyschkha, 1900 m, jugum Poev, reg. alp.-subalp, 31.08.1894, Albov 174 [Lectotype: LE designated by Leute (1970: 489); Lectotype: G]

Plant perennial, entirely smooth, glaucescent. Stem 50–120 cm high, hollow, ribbed. Basal leaves long-petioled, 2-ternate, with sessile or short petioluled lateral segments, terminal segment on longer petiolule, these and other segments dissected into five large oblong- or ovate-lanceolate cuneately tapering and decurrent lobes, often irregularly toothed or incised, 4–7 cm long and 1–2 cm wide; upper leaves smaller, their shorter petioles dilated to sheath, with tripartite terminal and bifid lateral

segments, rarely all entire or toothed or incised. Umbels large with many (15–40) unequal scabrous rays; terminal umbel with fertile flowers, the lateral sterile, bracts absent or one narrowly linear. Umbellets of many roughly scabrous rays, bracteoles 3–7, linear-filiform, much shorter than umbellet rays. Calyx teeth reduced. Petal white; peripheral shorter than 1.7 mm. Mericarps elliptic or oblong-elliptic, 4–5 mm long, 1.5–3.5 mm wide, terete with five primary equal ribs, winged; vascular bundles compact, situated in the middle parts of ribs, vittae 1–4 in each furrow, 4–6 on commissural side, mature seed fills the whole locule. Stylopodium longconical, styles recurved, twice as long as stylopodium (Figs 1 & 2).

Specimens examined: IRAN: Ardabil province, Khalkhal, Aq-Dagh Protected Area, Lerd village, 37°21'20" N, 48°37'57" E, 2050 m a.s.l., 17.08.2022, M. Bidarlord (10025 GILAN); 37°21'22" N, 48°37'58" E, 2070 m a.s.l., 18.09.2022, M. Bidarlord (10026 GILAN).

Phenology: Flowering in late Jul.–Sept.; fruiting in Aug.–Oct.

Distribution and Habitat: *Cnidiocarpa physo-spermifolia* was discovered and collected from the subalpine wetland, as a small population with about less than five hundred individuals. Collected area is located around Lerd village, Khalkhal county (Fig. 3). Although, this area has been transformed into a garden, but its plants (especially in the wetlands), have remained intact and are growing in their native and natural vegetation community. The growing area is located along a large and humid valley. Associated plants attain considerable sizes and compact concentration. They include some species as *Carex orbicularis* Boott, *Cirsium hygrophilum* Boiss., *Dactylis glomerata* L., *Festuca rubra* L., *Heracleum persicum* Desf. ex Fisch., C.A.Mey. & Avé-Lall., *Lonicera caucasica* Pall., *Mentha longifolia* (L.) L., *Primula auriculata* Lam., *Ranunculus amblyolobus* Boiss. & Hohen., *Salix aegyptiaca* Thunb., and *Trifolium repens* L.

Discussion

Ligusticum physospermifolium was first described by Albov in 1895. This species was transferred to the genus *Macrosciadium* as *M. physospermifolium* (Albov) V.N.Tikhom. & Lavrova followed by Spalik *et al.* (2004), Mozaffarian (2007), and Nobis *et al.* (2009). This treatment was not accepted by Pimenov as he transferred this species into the genus *Cnidiocarpa* as *C. physospermifolia* (Albov) Pimenov (Pimenov 2005). Based on molecular study by Valiejo-Roman *et al.* (2006), Hand (2011) introduced the new combination as *Selinum physospermifolium* (Albov) Hand, which was accepted by his contemporaries (Parr *et. al.* 2014, Mabberley 2017, POWO 2020). Recently, Plunkett *et al.* (2018) in comprehensive revision of *Apiaceae* family, considered *Macrosciadium* as synonym for *Cnidiocarpa*, as well as Ostroumova *et al.* (2019) in their taxonomical synopsis, well circumscribed this genus and closely related taxa.

Cnidiocarpa alata as *Macrosciadium alatum* (M.Bieb.) V.N.Tikhom. & Lavrova, was recorded from NW of Iran (Mozaffarian 2007). *C. physospermifolia* can be easily distinguished from *C. alata* by fine ribbed or striated stems in upper part (vs. winged ribbed stems in upper part), leaves 2-ternate (vs. more ternately dissected), segments toothed or irregularly or shallowly incised (vs. segments deeply incised), and peripheral petals shorter than 1.7 mm (vs. peripheral petals longer than 1.7 mm).

The identification key for the species of *Cnidiocarpa*

1. Leaf blades obovate or lanceolate in outline; primary leaf segments with short (5–10 mm) petioles; corolla pink ..... *C. rhodopetala*
- Leaf blades obovate-lanceolate, broadly obovate or triangulate in outline; primary leaf segments with petioles more than 10 mm long; corolla white…….. 2
2. Stems in upper part alate ..... *C. alata*
- Stems in upper part finely ribbed or striated 3
3. Leaf blades broadly obovate or even rounded in outline; number of secretory ducts in mericarp furrows 1–4, on commissural side 4–6 ..... *C. physospermifolia*
- Leaf blades obovate-lanceolate or triangulate in outline; number of secretory ducts in mericarp furrows solitary, on commissural side double 4
4. Sheath of stem leaves utriculate; number of bracts 7–11; number of bracteoles 7–10; mericarps 5–6 mm long, 2–3 mm broad ..... *C. coniifolia*
- Sheath of stem leaves narrow; bracts absent or 1 (few); number of bracteoles 2–4; mericarps 3–4 mm long, 1.5–2 mm broad ..... *C. alaica*

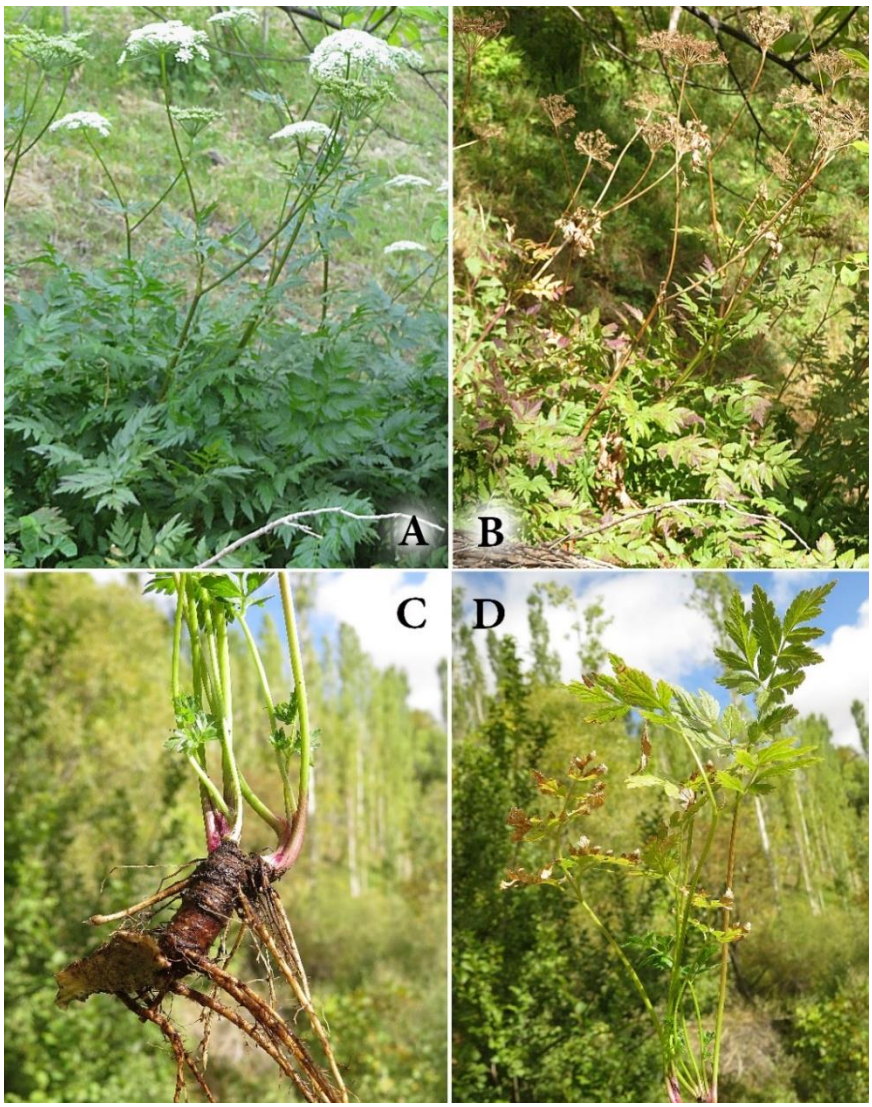

Fig. 1. A-B. *Cnidiocarpa physospermifolia* : A. In flowering, B. In fruiting, C. Root and lower leaves.

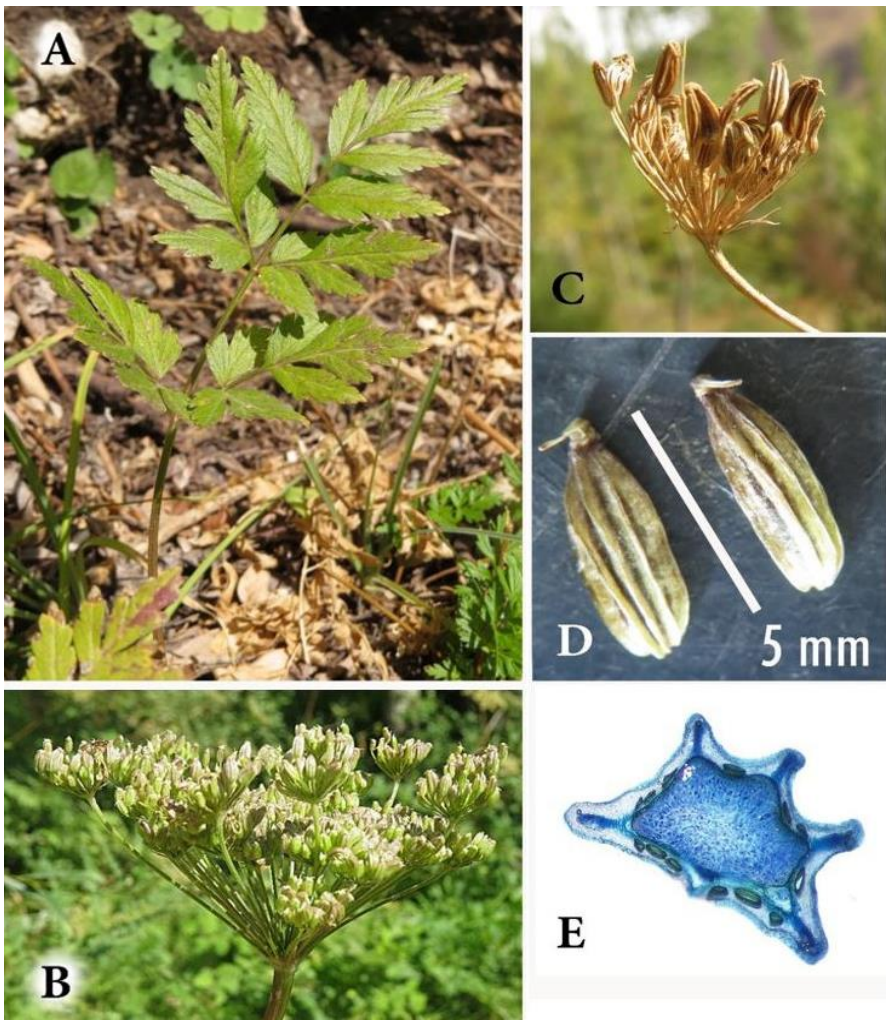

Fig. 2. *Cnidiocarpa physospermifolia*: A. Leaf segments, B. Umbel in fruiting, C. Umbellets and involucre, D. Mericarps, E. Mericarp transection.

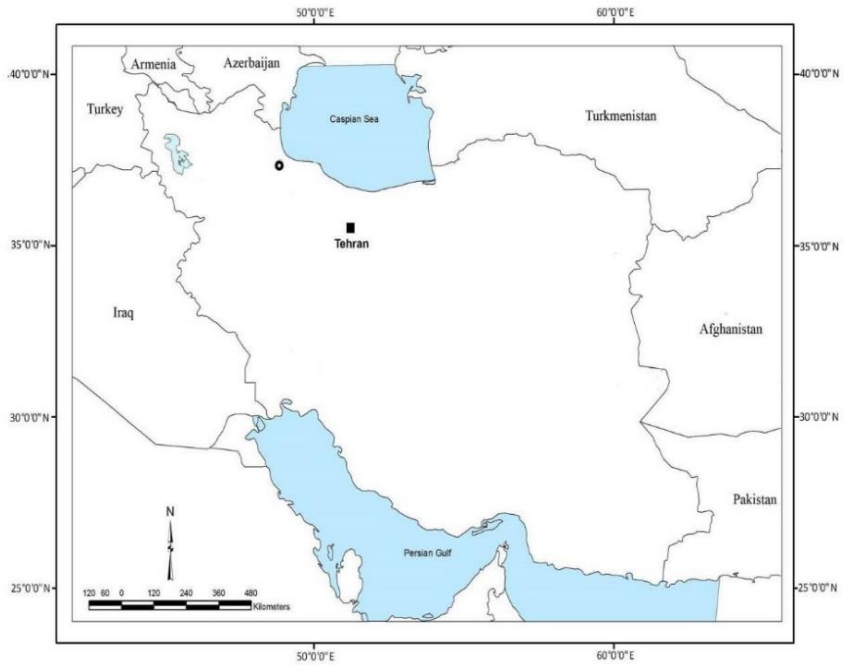

Fig. 3. Distribution of *Cnidiocarpa physospermifolia* in Iran (●).

Acknowledgments

This study was supported by the Research Institute of Forests and Rangelands, Tehran, Iran (Project No.: 2-58-09-008-980207: "Floristic study of Agh-Daq Protected Area"). The Russian part of the team was supported by the Russian Foundation for Basic Research, Moscow, Russia (Project No.: 20-54-56017).

References

Albov, N.M. 1895. Materials for Flora of Colchis (Prodromus Florae Colchicae). Proc. Tiflis Bot. Garden 1, 287.

GBIF.org. 2022. The Global Biodiversity Information Facility. Available from: https://www.gbif.org/species/7671179 [Accessed 20 Oct. 2022].

Hand, R. 2011. The Euro Med treatment of Apiaceae. Willdenowia 41(2): 245–250.

Hedge, I.C. & Lamond, J.M. 1972. *Ligusticum* L. Pp. 430–431. *In*: Davis, P.H. (ed.), Flora of Turkey and the East Aegean Islands, Vol. 4. Edinburgh University Press, Edinburgh.

Leute, G.H. 1970. Untersuchungen über den Verwandtschaftskreis der Gattung *Ligusticum* L. (Umbelliferae) II. Teil. Annalen des Naturhistorischen Museums in Wien 74: 457–519.

Linczevski, I.A. 1950. *Ligusticum* L. Pp. 567–579. *In*: Schischkin, B.K. (ed.), Flora URSS. Vol. 16. Akad. Nauk SSSR, Moskva-Leningrad.

Mabberley, D.J. 2017. Mabberley's Plant-book: a portable dictionary of plants, their classification and uses, ed. 4. Cambridge University Press, Cambridge.

Mozaffarian, V. 2007. Umbelliferae. Pp. 1–596. *In*: Assadi, M. & Maassoumi, A.A. (eds), Flora of Iran, Vol. 54. Research Institute of Forests and Rangelands, Tehran (In Persian).

Ostroumova, T.A., Kljuykov, E.V., Lavrova, T.V. & Ukrainskaja, U.A. 2019. Delimitation of the genera *Katapsuxis*, *Cnidiocarpa* and *Selinum* (Umbelliferae) and the taxonomical synopsis. Turczaninowia 22(2): 43–57.

Nobis, M., Nobis, A. & Kozak, M. 2009. Taxonomy and Distribution of *Macrosciadium alatum* (Bieb.) V. Tichomirov and Lavrova [Apiaceae]: a new alien species in the flora of Europe. Acta Societatis Botanicorum Poloniae 78(2): 131–136.

Parr, C.S., Wilson, M.N., Leary, M.P., Schulz, K.S., Lans, M.K., Walley, M.L., Hammock, J.A., Goddard, M.A., Rice, M.J., Studer, M.M. & Holmes, J.T. 2014. The Encyclopedia of Life, Vol. 2: Providing global access to knowledge about life on earth. Biodiversity Data Journal 2: e1079, doi: 10.3897/BDJ.2.e1079.

Pimenov, M.G. 1983. *Cnidiocarpa*, a new genus of the family Umbelliferae. Botanicheskii Zhurnal 68(1): 86–89 (In Russian).

Pimenov, M.G. 2005. Taxonomic additions and corrections in the genus *Cnidiocarpa* (Umbelliferae). Botanicheskii Zhurnal 90: 250–256 (In Russian).

Pimenov, M.G. 2018. Updated checklist of Chinese Umbelliferae: nomenclature, synonymy, typification, distribution. Supplementum. Turczaninowia 21(1): 113–123.

Plunkett, G.M., Pimenov, M.G., Reduron, J.P., Kljuykov, E.V., Lee, B.Y., van Wyk, B.E., Tilney, P.M., Watson, M.F., Ostroumova, T.A., Spalik, K. & Hart, J.M. 2018. Apiaceae. Pp. 9–206. *In*: Kubitzki K. (ed.), The families and genera of vascular plants, Apiales, Gentianales (except Rubiaceae), Vol. 15. Springer International Publishing, AG.

POWO. 2020. Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. http://www.plantsoftheworldonline.org.

Pu, F.T. & Watson, M.F. 2005. *Ligusticum* L. Pp. 140–151. *In*: Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds), Flora of China, Vol. 14. Missouri Botanical Garden Press.

Rechinger, K.H. 1987. *Ligusticum* L. Pp. 355–360. *In*: Rechinger, K.H. (ed.), Flora Iranica, Vol. 162. Akademische Druck- u. Verlagsanstalt, Graz.

Ren, T., Xie, D., Peng, C., Gui, L., Price, M., Zhou, S. & He, X. 2022. Molecular evolution and phylogenetic relationships of *Ligusticum* (Apiaceae) inferred from the whole plastome sequences. BMC Ecology and Evolution 22(1): 1–14.

Spalik, K., Reduron, J.P. & Downie, S.R. 2004. The phylogenetic position of *Peucedanum* sensu lato and allied genera and their placement in tribe Selineae (Apiaceae, subfamily Apioideae). Plant Systematics and Evolution 243(3): 189–210.

Sun, N., He, X. J. & Zhou, S. D. 2008. Morphological cladistic analysis of *Ligusticum* (Umbelliferae) in China. Nordic Journal of Botany 26(1–2): 118–128.

Tamamshian, S.G. 1967. Umbelliferae. Pp. 5–137. *In*: Grosseim A.A. (ed.), Flora Caucaica, Vol. 7. Leningrad: “Nauka” (In Russian).

Thiers, B. 2022. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden, Bronx. http://sweetgum.nybg.org/ih.

Tutin, T.G. 1968. *Ligusticum* L. Pp. 356. *In*: Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. (eds), Flora Europaea, Vol. 2. Cambridge University Press, Cambridge.

Valiejo-Roman, C.M., Shneyer, V.S., Samigullin, T.H., Terentieva, E.I. & Pimenov, M.G. 2006. An attempt to clarify taxonomic relationships in “Verwandtschaftskreis der Gattung Ligusticum” (Umbelliferae-Apioideae) by molecular analysis. Plant Systematics and Evolution 257: 25–43.