

A NEW SPECIES OF ONOBRYCHIS (PAPILIONACEAE) FORM IRAN

F. Ghanavati & H. Amirabadizadeh

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Onobrychis sanandajensis is described as a new species from W. Iran. This taxon belongs to sect. *Onobrychis*. The new species differs from *O. megataphros*, *O. shahpurensis* and *O. neychalanensis* by the number of pairs, shape and size of leaflets; calyx size; corolla size and features of pod. The description of the new taxon along with the illustrations are given. An identification key comparing the new species with the closest species is presented.

Farangis Ghanavati (correspondence <farangisghanavati@yahoo.com>), Seed and Plant Improvement Institute, Agricultural Research, Education and extension Organization (AREEO), Karaj, Iran & Hassan Amirabadizadeh, Khorasan Razavi Agricultural and Natural Resources Research and Education Center, Mashad, Iran.

Key words: *Onobrychis*; Leguminosae; new species; Iran

گونه‌ای جدید از جنس *Onobrychis* (Papilionaceae) از ایران

فرنگیس قنواتی: عضو هیأت علمی مؤسسه تحقیقات اصلاح و تهیه بذر و نهال، سازمان تحقیقات، آموزش و ترویج کشاورزی، کرج، ایران
حسن امیرآبادی‌زاده: کارشناس ارشد، مرکز تحقیقات کشاورزی و منابع طبیعی استان خراسان رضوی، مشهد، ایران
گونه *Onobrychis sanandajensis* متعلق به بخش *Onobrychis* به عنوان گونه جدیدی از غرب ایران نامگذاری و شرح داده می‌شود. گونه جدید در شکل، اندازه و تعداد جفت برگچه؛ اندازه کاسه گل؛ رنگ و اندازه جام گل و ویژگی‌های نیام با *O. megataphros*, *O. shahpurensis* و *O. neychalanensis* تفاوت دارد. علاوه بر این، توضیحات گونه جدید همراه با تصاویر و ویژگی‌های کلیدی آن در مقایسه با گونه‌هایی که بیشترین مشابهت را با آرایه جدید دارند ارائه می‌گردد.

INTRODUCTION

The genus *Onobrychis* Mill. (Gard. Dict. Abridge, ed. 4: 1754), belongs to legume family (Fabaceae) tribe Hedysareae (Polhill 1981, Lock 2005) and including about 173 annual or perennial species are presently known worldwide. It occurs especially in southwestern Asia and the Mediterranean region. However, its biodiversity centers are in Iran and Anatolia (Lock 2005, Yildiz & al. 1999), in temperate Europe and Asia (Cronquist 1981, Zohary 1987).

In Flora Iranica (Rechinger 1984), *Onobrychis* is divided into two subgenera namely *Onobrychis* (including sections *Dendrobrychis*, *Lophobrychis*, *Onobrychis* and *Laxiflorae*) and *Sisyrosema* (including sections *Anthyllium*, *Afghanicae*, *Heliobrychis*, *Hymenobrychis* and *Insignes*). But recent Phylogenetic

study indicate that *Onobrychis* is monophyletic and composed of two main clades, each corresponding to the redefined subgenus *Onobrychis* (including sections *Onobrychis* and *Hemicyclobrychis*) and subgenus *Sisyrosema* (including sections *Afghanicae*, *Laxiflorae*, *Heliobrychis*, *Hymenobrychis*, *Insignes*, *Lipskyanae* and *Litvinovianae*), respectively. Sections *Lipskyanae* and *Litvinovianae* are newly established and described (Amirahmadi & al. 2016).

The new taxon belongs to the section *Onobrychis* subgenus *Onobrychis*. This section was shown in the Flora Iranica as comprising 14 taxa (Rechinger 1984); but this number has been increased to 23 with taxonomic studies in Iran and Anatolia in recent years. (Ranjbar & al. 2007, 2011, 2012, Amirabadizadeh 2011, Amirabadizade & Ghanavati 2013, Toluei & al.

2013, Amirahmadi & al. 2014, Aybeke & Dane 2017). In this paper, the new Iranian taxon *Onobrychis sanandajensis* Amirabadi. & Ghanavati (Sect. *Onobrychis*) is described from Kurdistan province of Iran.

MATERIAL AND METHODS

This study is mainly based on the herbarium material and the field observations during excursions throughout Iran. Plants were collected from Abidar mountainous area near Sanandaj that reside in W. Iran and archived using conventional herbarium methods; voucher specimens are preserved in Herbaria of Mashhad Research Center (MRCH), TARI and Seed and Plant Improvement Institute (*Genetics research and National plant gene bank of Iran*). The specimens in the herbaria of TARI, IRAN, FUMH and all of Iranian Research Centers of Agricultural Research, Education and Extension Organization. Following Floras have been checked for new taxon. Flora Iranica (Rechinger 1984), Flora of Iraq (Townsend 1974), Flora of the URSS (Grossheim 1948), Flora of Turkey (Hedge 1970), Flora of Armenia (Takhtajan 1962), Flora of Azerbaijan (Kariatin 1954) and some general references (Boissier 1872, Sirjaev 1926) were used as the main literature.

RESULTS

Onobrychis sanandajensis Amirabadizadeh & Ghanavati (figs. 1 and 2).

Type: IRAN: Kurdistan, Abidar mountainous area, west of Sanandaj, 1820 m a.s.l., 28 May 1998, H. Amirabadizadeh, (holotype: MRCH 7224, isotype: TARI).

Perennial herb, woody at base, up to 55 cm tall. Stems erect to ascending, numerous, striated, loose-leaved, with scattered adpressed and erect white hairs app. 0.6 mm long or glabrescens in some parts. Stipules free, scarious with brownish stripes, up to 6.6 mm long, lanceolate-subulate, acute, sparsely appressed hairs or more or less glabrous. Leaves clearly shorter than peduncles; lower leaves long-petiolate, up to 13.5 cm, with 5-6 pairs of elliptic or linear leaflets; leaflets 5-16 mm long, 2.5-3 mm wide, spreading hairy on both surfaces but more densely below, rounded and short-mucronate; upper leaves sessile, with 4-5 pairs of linear leaflets, mucronate, 23-26 mm long, 2-3.5 mm

wide. Spikes many-flowered (up to more than 40 flowers), ovate before flowering, dense, 2.8-5.5 cm, elongating after flowering and in fruit. Bracts membranous, white with brownish stripes, 2.3-3.3 mm long, lanceolate or triangular-subulate or linear, acuminate, glabrous or with scattered hairs. Pedicel 1.1-1.5 mm long, densely pilose. Calyx 9-9.5 mm long; teeth 2 times as long as tube, unequal, linear-subulate, densely hirsute; tube glabrescens. Bracteoles linear, ciliate, 0.5-1.1 mm long. Corolla pink rose with darker striations, becoming violet-colored upon drying, glabrous; standard obovate, 10.5-10.8 × 7.5-8 mm, emarginate; wings short, 5 × 2.2-2.5 mm, auriculate; claw 1.8 mm long; keel almost equal to standard, truncate, claw 3.7-4 mm. Ovary pilose, 1.3 × 0.8 mm. Pods (juvenile) 5.6-6 × 5 mm, obovate, loosely appressed hairy, with 5 unequal triangular or subulate teeth on crest; disc foveolate at 2 rows, with 4-7 aciculiform spines up to 1.5 mm long around the margins of the areolae on each sides.

Onobrychis sanandajensis is more closely related to short-winged species, including *O. shahpurensis* Rech. f., *O. neychalanensis* Ranjbar, Hadadi & Karamian and *O. megataphros* Boiss. but it differs from *O. shahpurensis* in having 4-6 pairs of leaflets (not 6-8 pairs), calyx length 9-9.5 mm (not 5-8 mm) and pink-rose corolla with deeper colored veins (not milk-white). It differs from *O. neychalanensis* by longer calyx and standard, indumentum of pod without setae and having long spines on the crest. But mainly differs from *O. megataphros* with a dorsoventrally convex pod (not a dorsoventrally almost straight pod) and with densely spikes (not laxiflorous raceme). A comparison of the most important diagnostic characters of the new species, *O. shahpurensis*, *O. neychalanensis* and *O. megataphros* is presented in table 1.

Distribution and habitat: Abidar is a mountain in the west of Sanandaj, Kurdistan province, Iran (fig. 3) with an elevation of 2550 meters. So far, *O. sanandajensis* is a rare local endemic species and known only from the locality type where it grows on the dry steppe zone at the elevation of 1820 m a.s.l. The average minimum and maximum annual temperatures and the annual precipitation at the location are -5.4°C, 36.8°C, and 458.4 mm respectively. (Hanafi & Hatami 2013).

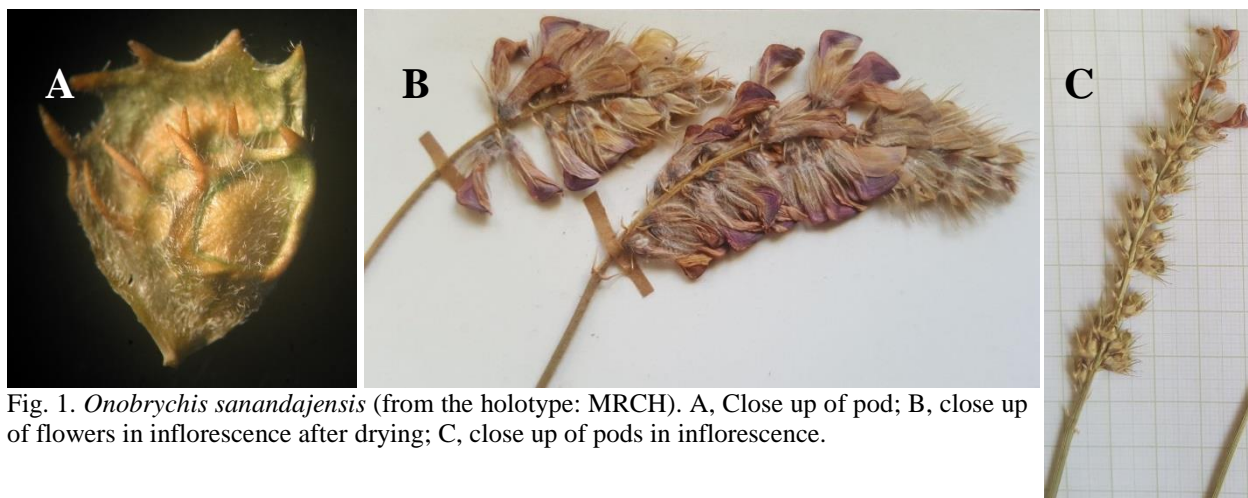


Fig. 1. *Onobrychis sanandajensis* (from the holotype: MRCH). A, Close up of pod; B, close up of flowers in inflorescence after drying; C, close up of pods in inflorescence.

Key to the new species and nearest *Onobrychis* taxa

1. Plant up to 70 cm high. Corolla pink-rose or intensely rose; standard 10-10.8 mm long 2
 - Plant up to 40 cm high. Corolla milk-white or pale pink; standard 8.5-9.5 mm long 3
 2. Leaves with 4-6 pairs of leaflets. Racemes dense. Pod dorsoventrally convex; disk with long spines at 2 rows *O. sanandajensis*
 - Leaves with 4-8 pairs of leaflets. Racemes laxe. Pod

dorsoventrally almost straight; disk with short spines at 1 row *O. megataphros* Boiss.
 3. Plant indumentum sparse. Corolla white. Pod with 4-6 spines on the crest, without setae; disk with 6 depressions *O. shahpurensis* Rech.f.
 - Plant indumentum dense. Corolla pale pink. Pod with 6-8 spines on the crest, covered by purple setae; disk with 8 depressions
 *O. neychalanensis* Ranjbar, Hadadi & Karamian

Table 1. Comparison of the diagnostic morphological characters of *Onobrychis sanandajensis* with close species.

Characters	<i>O. megataphros</i>	<i>O. shahpurensis</i>	<i>O. neychalanensis</i>	<i>O. sanandajensis</i>
Height (cm)	30-70	(25) 40	40	55
Leaflet shape	oblong-lanceolate or narrowly elliptic	narrowly linear	elliptic to linear	linear or rarely elliptic
Leaflet size (mm)	10-20 × 3-6	15-30 × 0.5-2	12-25 × 2-3.5	16-26 × 2-3.5
Number of leaflets pairs	4-8	6-8	5-7	4-6
Raceme	loose-flowered	densely-flowered	densely-flowered	densely-flowered
Flower number	many-flowered	34	24-34	up to 42
Calyx length (mm)	5-7	5-8	7.8-8	9-9.5
Corolla color	intensely rose	milk-white	pale pink	pink-rose with darker colored lines
Standard length (mm)	10	8.5-9.5	9-9.5	10.5-10.8
Wings length (mm)	3-4	4	4	5
Shape of legume	suborbicular	wide obovate	semiorbicular	somewhat obovate
Pod size (mm)	8-9	6-8	8-8.3	5-6
Indumentum of pod	without setae	without setae	with purple setae	without setae
Number of spines on crista	5-8	3-5	6-8	5
Number of spines on disk	7	5	4-5	4-7
Number of central cavities on pod	2	2, large	-	1, large
Number of marginal cavities on pod	6	6-8	8	4-5
Faces of pod	spiny	with short spinules	with several teeth	with long spines

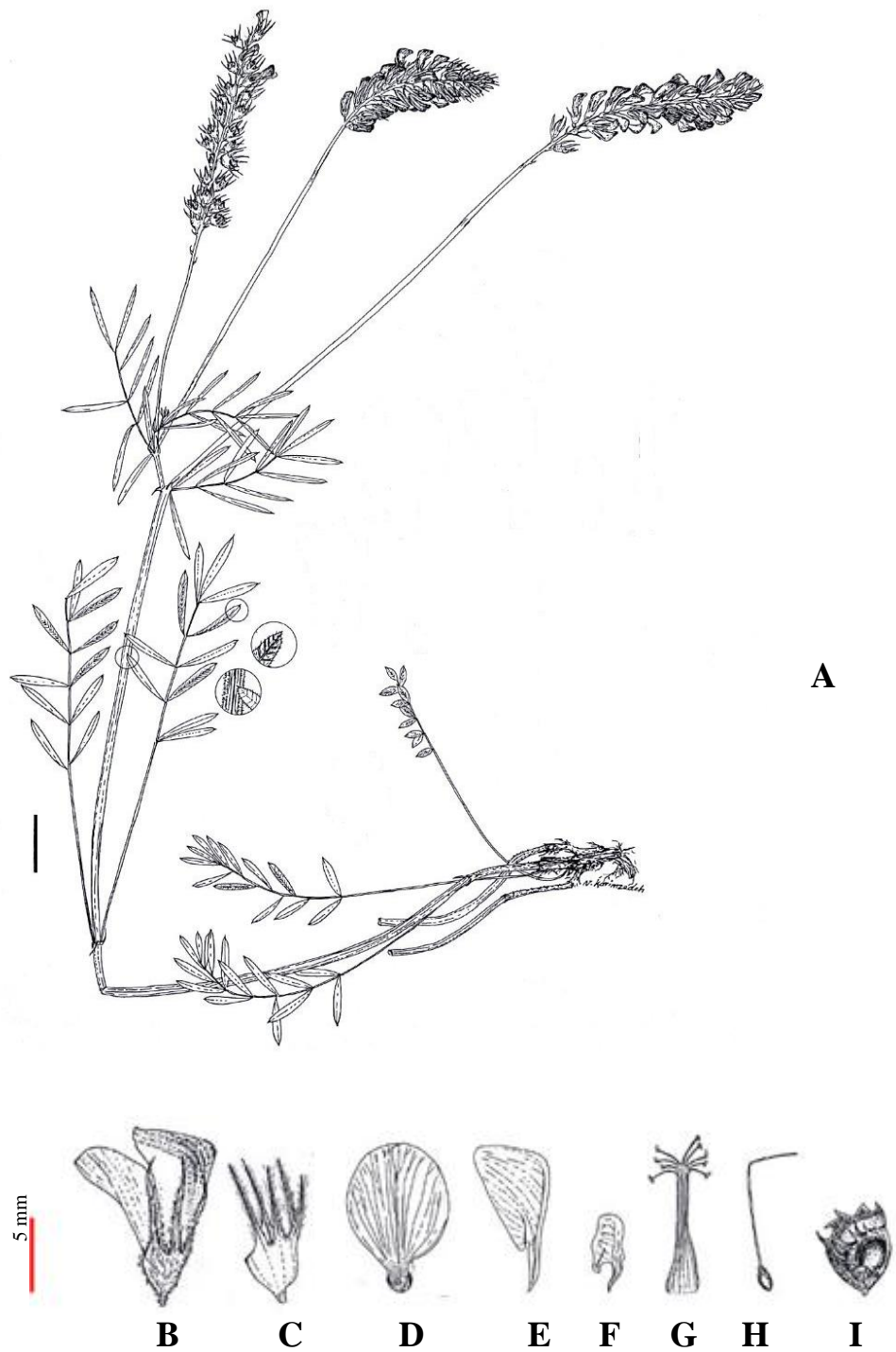


Fig. 2. *Onobrychis sanandajensis*. A, habit; B, flower; C, calyx; D, standard; E, keel; F, wing; G, androecium; H, ovary; I, pod. Scale bar for A=2 cm and B-I = 5 mm.

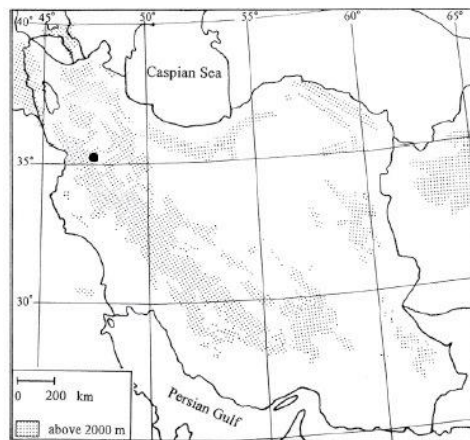


Fig. 3. Distribution map of *Onobrychis sanandajensis*. (●) in Iran.

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REFERENCES

- Amirabadizadeh, H. 2011: New records of Hedysareae (Papilionaceae) from Iran. -Iranian Journal of Botany 17: 63–68.
- Amirabadizadeh, H. & Ghanavati, F. 2013: *Onobrychis oxyptera* Boiss. var. *unifoliolata* (Fabaceae), a new variety from Iran. -Iranian Journal Botany 19 (2): 173–175.
- Amirahmadi, A., Kazempour, S.O., Mozaffar, M.K. & Charkhchian, M. M. 2014: A new species of *Onobrychis* sect. *Onobrychis* (Fabaceae) from Iran. - Turkish Journal of Botany 38: 658–664. <https://doi.org/10.3906/bot-1309-54>
- Amirahmadi, A., Kazempour-Osaloo, Sh., Kaveh, A. Maassoumi, A. A. & Naderi, R. 2016: The phylogeny and new classification of the genus *Onobrychis* (Fabaceae-Hedysareae): evidence from molecular data. -Plant Systematics and Evolution 302: 1445–1456. <https://doi.org/10.1007/s00606-016-1343-1>
- Aybeke, M. & Dane, F. 2017: *Onobrychis mehmetchiquii* (Fabaceae) *sp. nov.*, a new species from European Turkey. Phytotaxa 298 (1): 096–100. <https://doi.org/10.11646/phytotaxa.298.1.11>
- Cronquist, A. (1981) An integrated system of classification of flowering plants. -Columbia University Press, New York.
- Hanafi, A. & Hatami, I. 2013: Producing climate map for Kurdistan province using information technology system. Scientific- Research Quarterly of “Geographical Data (SEPEHR)” 22 (87): 24–28.
- Hedge, I. C. 1970: *Onobrychis*. In: Davis, P.H. (Ed) Flora of Turkey and the East Aegean Islands 3. -University Press, Edinburgh, pp. 560–589.
- Lock, J. M. 2005: Tribe Hedysareae. In: Lewis, G., Schrire, B., Mackinder, B. & Lock, M. (Eds.) Legumes of the world. -Royal Botanical Gardens, pp. 489–495.
- Miller, P. 1754: *Granadilla, Passion-flower*, Gard. Dict. Abr. (ed. 4). [The volume has no page numbers] Available from: <http://www.tropicos.org/Reference/100000805> (accessed 23 January 2017)
- Polhill, R. M. 1981: Hedysareae DC. In: Polhill, R. M. & Raven, P. H. (Eds.) Advances in legume systematics, vol. 1. -Royal Botanical Gardens, pp. 367–370.
- Ranjbar, M., Hadadi, A. & Karamian, R. 2011: Systematic study of *Onobrychis shahpurensis* (Fabaceae) in Iran, with the description of *O. neychalanensis sp. nov.* - Nordic Journal of Botany 29: 163–174. <https://doi.org/10.1111/j.1756-1051.2011.01099.x>
- Ranjbar, M., Karamian, R., Hadadi, A. & Joharchi, M. 2012: Taxonomic notes on *Onobrychis* sect. *Onobrychis* subsect. Macropterae (Fabaceae) from Iran. -Phytotaxa 39: 51–60. <https://doi.org/10.11646/phytotaxa.39.1.5>
- Ranjbar, M., Karamian, R., Tolui, Z. & Amirabadizadeh, H. 2007: *Onobrychis assadii* (Fabaceae), a new species from Iran. -Annales Botanici Fennici 44: 481–484.
- Rechinger, K. H. 1984: *Onobrychis* (Hedysareae-Papilionaceae II). In: Rechinger, K. H. (Ed.) -Flora Iranica, Vol. 157. Akademische Druck, pp. 387–464.
- Tuloei, Z., Ranjbar, M., Wink, M. & Atri, M. 2013b: Molecular characterization of *Onobrychis altissima* (Fabaceae) populations from Iran, with the description of *O. chaldoranensis sp. nova.* -Annales Botanici Fennici 50: 249–257.