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On the occurrence of *Sisymbrium orientale* (Cruciferae) in Middle Asia

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***Summary*.** The matter of presence of *Sisymbrium orientale* in the flora of Middle Asia long known in the region based on the single gathering from Turkmenistan is clarified. Occurrence of the species in the latter country is not confirmed because of incorrect identification of relevant collection which belongs to *S. septulatum*. At the same time, *S. orientale* is a novelty for the region based on its recent (2023) finding in Uzbekistan first reported here. Alien character of the gathering is proposed and further spread of the species in the Middle Asia is assumed.

О произрастании *Sisymbrium orientale* (Cruciferae) в Средней Азии

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***Ключевые слова*:** Туркменистан, Узбекистан, флористическая находка, чужеродный вид, Brassicaceae, *Sisymbrium septulatum*.

***Аннотация*.** В сообщении уточняется вопрос присутствия во флоре Средней Азии *Sisymbrium orientale*, долгое время приводившегося для региона на основании единственного сбора из Туркменистана. Показана ошибочность данной информации ввиду принадлежности соответствующего образца к *S. septulatum*. Вместе с тем *S. orientale* является новинкой флоры Средней Азии на основании первого сбора вида в Узбекистане, сделанного в 2023 году. Постулируется заносный характер находки, предполагается дальнейшее расселение *S. orientale* в регионе.

Further revision of Cruciferae Juss. (Brassicaceae Burnett) collections from the Middle Asia in the herbaria LE, MW and TASH (coupled with the study of an image from BRNM) in connection with 'Flora of Uzbekistan' project along with floristic examination of Fergana Valley enabled clarifying the item of occurrence and current status of eastern rocket (*Sisymbrium orientale* L.) in the region. Results of this study are briefly presented below.

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Sisymbrium orientale L., 1756, Cent. Pl. II: 24.

Provenance in the protologue: "Habitat in Oriente. Miller".

Lectotype (Jonsell, 1982, Fl. Trop. East Africa, 78: 64): Herb. Linn. 836.43 (LINN!).

Sisymbrium orientale L. is one of the most widespread representatives of relevant genus. While, like in many congeners, its natural range is predominantly confined to Mideterranean and SW Asian regions, nowadays it is introduced in other parts of Eurasia and Africa as well as in all other continents, except Antarctida (Al-Shehbaz, 2012, 2015; POWO, 2023) where it behaves as a weed occupying various types of open, chiefly disturbed habitats. The species demonstrates tendency of further expansion, in particular, in Asia. For example, it was first recorded from China some 20 years ago based on gatherings from Fujian and Shanxi (Zhou et al., 2001) and subsequently found in yet another province, Yunnan (Zhou et al., 2007).

In the Middle Asia, the species has been hitherto known only from Turkmenistan (Hedge, 1968; Bondarenko, 1974; Nikitin, 1983; Gudkova, 1985; Nikitin, Geldikhanov, 1988; POWO, 2023) where it was first recorded by Litwinow (1902) based on his own gathering № 534 from Ashkhabad and Freyn (1903) who added two collections (from Ashkhabad and Kizil-Arwat, №№ 125 and 1656, respectively) by P. Sintenis. Both latter authors named relevant gatherings "*S. columnae forma glabrescens*, *floribus majoribus* Litw." and Freyn provided further details such as petals to 15 mm long indicating that these plants might belong to *S. septulatum* DC. rather than to *S. orientale*. Such a viewpoint was soon published by Bornmüller (1904: 1263) who definitely assigned Litwinow's collection № 534 to *S. erucastroides* (Stapf) Bornm. [= *S. septulatum*] and mentioned that the gathering of Sintenis from the same locality [i. e., exsiccate № 125] belongs to the same species, but he did not comment on the plant from Kizil-Arwat. Similarly, Schulz (1924: 122) explicitly attributed both of the above collections from Ashkhabad to *S. septulatum*, said nothing about the gathering of Sintenis № 1656 and did not cite a single collection of *S. orientale* from Turkmenistan. Accordingly, the latter species was not reported for the region in subsequent treatments (Vassilczenko, 1939, 1948). In contrast, Hedge (1968: 317), obviously not taking into account conclusions of Bornmüller and Schulz, cited all three discussed Turkmenian collections as *S. orientale*. Bondarenko (1974: 54) assigned both above-mentioned gatherings from Ashkhabad to *S. septulatum* and left for *S. orientale* the single locality, Kizil-Arwat, corresponding to Sintenis's collection № 1656; in this, she was followed by more recent authors (Gudkova, 1985; Nikitin, Geldikhanov, 1988).

As reviewed here, the fact of occurrence of *S. orientale* in Turkmenistan and Middle Asia as a whole is based on the single gathering of Sintenis from Kizil-Arwat which was not checked by any of the above-cited authors after Freyn (1903). This picture is fully reflected by the material stored at LE: it lacks the gathering № 1656, but other two collections are available and represented by two duplicates each. Both gatherings were misidentified in 1902 by V. I. Lipsky as *S. pannonicum* Jacq. [= *S. altissimum* L.] and correctly annotated in 1932 by I. T. Vassilczenko as *S. bilobum* (K. Koch) Grossh. [= *S. septulatum*], predated by E. G. Czerniakowska's revision of one of Sintenis's specimens as *S. erucastroides* in 1923. Absence of material on *S. orientale* from Turkmenistan in other relevant herbaria such as ASH (Gudkova, 1985: 112), MW and TASH, proves that no collections have been made from the country after Sintenis and revision of his specimen from Kizil-Arwat is critical for resolving the question.

The study of the image of Sintenis's plant № 1656 from Freyn's herbarium (Fig. 1), kindly provided by colleagues from BRNM, demonstrates that it cannot be attributed to *S. orientale* and, just like other two above-mentioned collections, belongs to *S. septulatum*. Although it lacks flowers with fully developed petals, most readily distinguishing the latter species from morphologically similar *S. orientale* and *S. altissimum*, a combination of strongly cucullate lateral sepals and deeply bilobed stigmas (Fig. 1, insertion) along with relatively short, 3–5.5 mm, pedicels unambiguously excludes other identifications. Hence, occurrence of *S. orientale* in Turkmenistan and Middle Asia in general by now is not confirmed.

Curiously enough, simultaneously with clarifying this item, the following collection was made in Fergana Valley (foothills of Kurama Range) by one of the present authors: "Uzbekistan. Namangan Province, natural monument Chust, vicinities of Kushtepa, [loose sagebrush community on very gentle stony slope, locally common]. N 41.050507, E 71.076648, h = 804 m a. s. l. 09. 04. 2023. R. Ruzimatov, S. Ruzimatova" (TASH 054575 [Fig. 2] & 054577; a duplicate to be transferred to LE). All characters suitable for identification (soft pubescence, simple and linear-lanceolate or hastate with 1–2 pairs of linear lobes upper leaves, short, 2–4 mm, pedicels as thick as fruits, non-cucullate sepals, siliques up to 10 cm and more, subclavate styles,

Fig. 1. Herbarium specimen of *Sisymbrium septulatum* from herb. Freyn collected by P. Sintenis (№ 1656) in Kizil-Arwat (BRNM 16568/33); insertion – close up view of sepals and stigmas.

Fig. 2. Herbarium specimen of *Sisymbrium orientale* from Fergana Valley (TASH 054575); insertion – close up view of fruit and pedicel pubescence.

etc.) indicate that it belongs to *S. orientale*. Pedicels and fruits covered with minute soft trichomes very characteristic of this species and untypical for *S. septulatum* and *S. altissimum* are shown on Fig. 2, insertion. Locality is shown on Fig. 3.

Regarding the status of the finding, despite it was made in more or less natural habitat within the protected area, *S. orientale* can only be considered a recent occasional introduction here as evidenced by the lack of other collections of the species from Uzbekistan and its current and previous absence in all neigbouring countries. Hence, the flora of Middle Asia is replenished by another alien weedy species. Since the population in vicinities of Kushtepa was found to include a number of fruiting plants with normally developed siliques and seeds, its establishment in Uzbekistan may well be expected and finding in other countries of the region is also possible.

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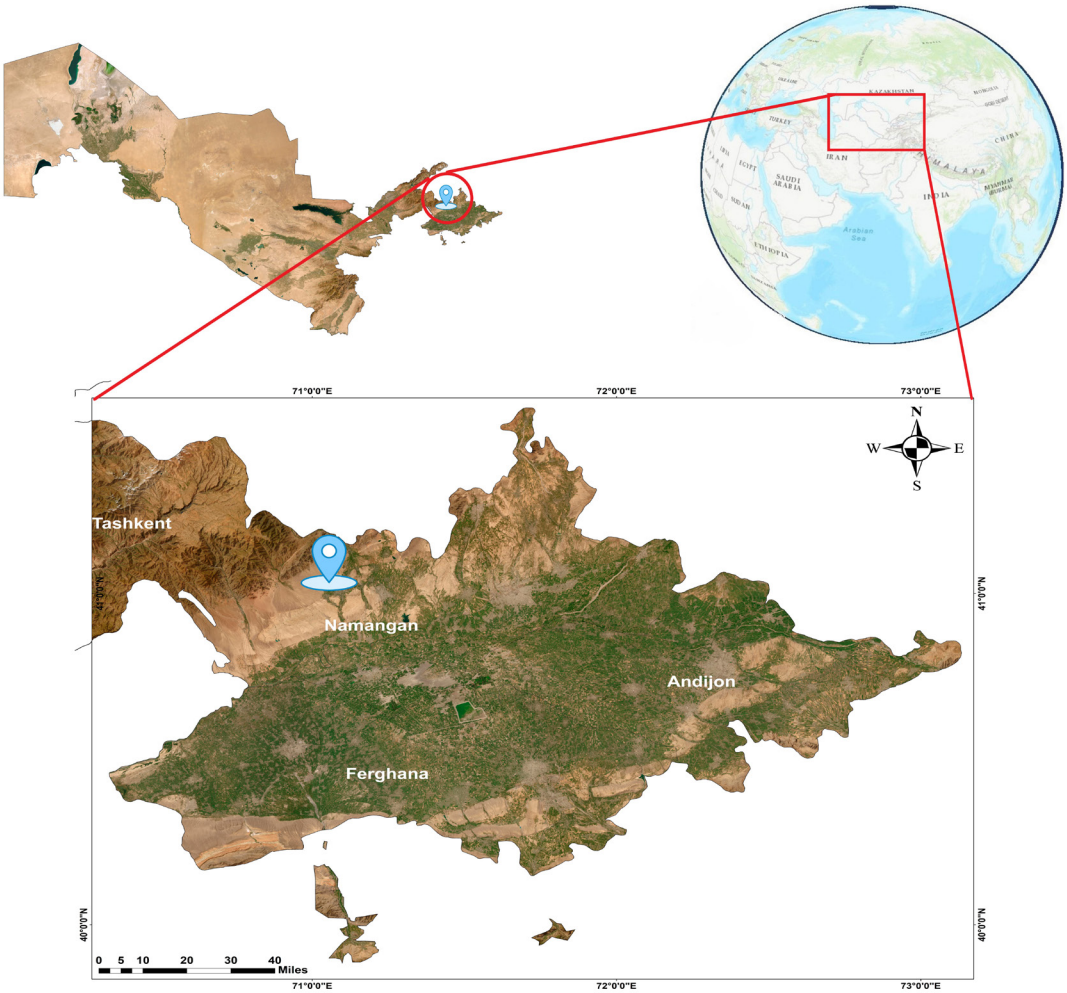

Fig. 3. Locality of the first collection of *Sisymbrium orientale* in Middle Asia.

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