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Towards a better knowledge on the Cruciferae diversity in Uzbekistan

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Summary. The paper presents updates of the knowledge on the species diversity and distribution of the mustard family (Cruciferae, or Brassicaceae) in Uzbekistan and Middle Asia in general, predominantly based on authors' collections of 2023–2024. Most of the novelties regard alien plants that include national records of *Diplotaxis muralis* and *Hirschfeldia incana*, both representing new genera in the flora of the country (*Diplotaxis* in Middle Asia as a whole) as well as updated data on the distribution of *Brassica napus*, *Camelina sativa*, *Cardamine hirsuta*, *Sisymbrium officinale* and *S. orientale* in Uzbekistan; the latter is also newly found in Tajikistan. For native *Draba kuramensis*, *Lepidium tianschanicum*, *Parrya pinnatifida*, *P. tojibaevii*, *Scapiarabis popovii* and *Strigosella latifolia*, additional localities are adduced including the first collections of *Draba kuramensis* documenting its occurrence in Uzbekistan. Besides, the presence of *Sisymbrium orientale* in Turkmenistan along with the absence of *Brassica nigra* in Uzbekistan (and Middle Asia) and *Cardamine densiflora* in Tian Shan and Kazakhstan are commented.

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К познанию видового состава крестоцветных (Cruciferae) Узбекистана

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Ключевые слова: аборигенные и чужеродные виды, Казахстан, распространение, Средняя Азия, Таджикистан, Туркменистан, фитоинвазия, флористические находки, Brassicaceae.

Аннотация. В сообщении приводятся данные, дополняющие информацию по видовому составу и распространению крестоцветных (Cruciferae, или Brassicaceae) Узбекистана и Средней Азии в целом, основанные преимущественно на сборах авторов 2023–2024 гг. В наибольшей степени обновления касаются адвентивной фракции флоры и включают первые указания для страны *Diplotaxis muralis* и *Hirschfeldia incana*, являющихся представителями новых для Узбекистана (*Diplotaxis* – и для Средней Азии) родов сосудистых растений, а также дополнения по распространению *Brassica napus*, *Camelina sativa*, *Cardamine hirsuta*, *Sisymbrium officinale* и *S. orientale* (последний также впервые найден в Таджикистане). Для аборигенных *Draba kuramensis*, *Lepidium tianschanicum*, *Parrya pinnatifida*, *P. tojibaevii*, *Scapiarabis popovii* и *Strigosella latifolia* приведены данные, дополняющие их распространение, включая первые подтверждённые сборами нахождения в Узбекистане *Draba kuramensis*. Кроме того, прокомментировано присутствие *Sisymbrium orientale* в Туркменистане, а также отсутствие *Brassica nigra* в Узбекистане и Средней Азии в целом и памиро-алайского *Cardamine densiflora* – на Тянь-Шане и в Казахстане.

Field studies in Uzbekistan in 2023–2024 were particularly focused on members of the mustard family (Cruciferae Juss., or Brassicaceae Burnett) in view of the treatment of relevant group for the national Flora currently in progress (Sennikov et al., 2016)[1]. Most interesting findings are included into the present communication; specimens are deposited in ALTB and TASH. Some data were also revealed during the revision of herbaria AA, MW and TASH, and online resource "Plantarium" [2007+].

Brassica napus L.

"Tashkent, Yakkasaray District, Shah Jahan Str. in ca. 100 m from Mukimi Str., 41°16'59.21"N, 69°14'20.97"E, 395 m a. s. l., along the fence, weed. 28 V 2024. D. A. German" (ALTB); "Tashkent, Mirzo Ulugbek District, vicinities of Shirin market, 41°20'47"N, 69°20'37"E, 491 m a. s. l., along the fence, weed. 13 VI 2024. D. A. German" (ALTB).

Brassica napus, widely cultivated worldwide and often behaving as egrasiophyte-ephemerophyte, is not included into *Conspectus Florae Asiae Mediae* (CFAM: Kovalevskaya, 1974). It has been reported for Middle Asia in some early sources, but, according to Sinskaya (1939), those records were based on misidentifications of *B. campestris* L. This conclusion is generally supported by the material of LE and TASH except for a couple of specimens collected by V. P. Drobow in 1919 near Tashkent, "on the field along Salar" (TASH) and most likely correctly determined as *B. napus* by M. G. Popov who also recorded the species as a plant occurring "in the gardens of Tashkent, frequently" (Popov, 1924, originally in Russian). These data do

1 The first six volumes of the new "Flora of Uzbekistan" containing treatments of 20 families with 184 genera and 820 species (about 19 % of flora) have been published in 2016–2023 (Sennikov, 2023).

not allow saying with certainty whether cultivated or weedy plants were collected and meant while our specimens were definitely weedy.

Camelina sativa (L.) Crantz [*C. glabrata* (DC.) Fritsch]

"Jizzakh Region, Farish District, N macroslope of Nuratau Range, northern vicinities of Saurbel pass, 40°21'34,06"N, 67°06'40,12"E, 822 m a. s. l., left bank of Kelvasay [Kulbasay], roadside. 9 V 2024. D. A. German, B. Q. Karimov" (ALTB).

The third record from Uzbekistan; hitherto *C. sativa* was known in the country based on old collections from Tashkent (Popov, 1924; German, 2024) and a rather recent (2006) one from Bukhara Region (German, l. c.).

Cardamine densiflora Gontsch.

"[Kazakhstan, Jambyl Region, Korday District]: KazSSR, Almaty Prov., [Chu-Ili Mts.], streamside on the Kurday [Korday] pass. 9 VII 1939. № 498. N. V. Pavlov" (AA); "[Uzbekistan, Tashkent Region, Bostanliq District]: KazSSR, South Kazakhstan Prov., Bostandyk. Bank of Pskem near Sijjak. Wet streamside. 7 VI 1954. № 50. V. N. Pavlov" (AA).

The existing information on the distribution of this species appears confusing and requires clarification. For quite a long time, it has been reported from Tian Shan (Vasilyeva, 1961, 1969; Shermatov, 1974; Aralbayev et al., 2002; Aralbay et al., 2007; Tojibaev, 2010; Sennikov, Tojibaev, 2021) which contradicts the data of other authors. For example, *C. densiflora* is not listed for Kazakhstan by Abdulina (1999). Accordingly, Yunusov (1978) and Khatri (1990) define it as endemic to western Pamir-Alay; furthermore, the prior author directly stresses that *C. densiflora* is erroneously mentioned in CFAM (Shermatov, l. c.) for Tian Shan. Here we provide details confirming this conclusion.

There are only two specimens in the studied herbaria, cited above, based on which *C. densiflora* could be recorded from Tian Shan. The one from Korday pass bears initial determination "*Cardamine turanica* N. Pavl. sp. n." by N. V. Pavlov and his later (17 IX 1949) revision "*Cardamine densiflora* Gontsch."; the second specimen is also determined by him as *C. densiflora*. Both specimens have duplicates in MW and bear other identifications. The one from Chu-Ili Mts. (MW 0834771), also with initial annotation "*C. turanica* N. Pavl. sp. n.", is revised on 8 XII 1976 by V. P. Botschantzev as *Nasturtium fontanum* (Lam.) Aschers. [= *N. officinale* W. T. Aiton], the one from West Tian Shan (MW 0834769) is determined by the collector as *N. officinale*. Despite the species identity of both gatherings needs to be corrected (see below), they definitely belong to *Nasturtium* W. T. Aiton and not *Cardamine* L. proving the correctness of exclusion of *C. densiflora* from the checklist of higher plants of Tian Shan and Kazakhstan.

As for the identity of the discussed specimens, because of having robust habit and narrowly linear fruits with semibiseriate seeds they represent *Nasturtium microphyllum* (Boenn.) Reichenb. Noteworthy, Jonsell (1973) reported only *N. officinale* for Tashkent Region, but these and some other specimens (TASH) prove the occurrence of both *Nasturtium* species in this area; in particular, Oigaing/Pskem valley is inhabited by *N. microphyllum*.

Cardamine hirsuta L.

"Termez, near the new mosque, 37.234682N, 67.257498E [37°14'04.86"N, 67°15'26.99"E], 299 m a. s. l., roadside. 16 III 2023. № QS-220190. R. Uralov, A. Ibragimov" (TASH).

It is the first record of this alien weedy species from the southern Uzbekistan; hitherto within the country it was only known from Tashkent (Tillaev, Gaziev, 2021; first collection dated 2006 – TASH). The nearest registered locality is Dushanbe and its vicinities where it was first collected in 1969 by S. Yu. Yunusov (LE), identified and recorded by Khatri (1989) and subsequently found by Ebel et al. (2020). As evidenced by these facts along with a recent finding of *C. hirsuta* in southern Kazakhstan (Ebel et al., 2015), further expansion of the species in Uzbekistan and Middle Asia as a whole is well expected.

Diplotaxis muralis (L.) DC.

"Fergana Valley, Namangan Region, Kasansay District, vicinities of Shark-Yulduzi, road Chust – Kasansay, 41.152356N, 71.453532E [41°09'08.48"N, 71°27'12.72"E], 816 m a. s. l., margin of cotton field. 24 VI 2024. O. T. Turginov" (ALTB, TASH); "[Same locality], 14 IX 2024. O. T. Turginov" (TASH).

This is the first record of a member of *Diplotaxis* DC. in Uzbekistan and Middle Asian region in general. The previous noteworthy introduction of the same species, *D. muralis*, presumably with construction material from E Europe, was registered in 2002 in neighboring Kazakhstan at the NE shore of Caspian Sea (Veselova, 2004), ca. 1600 km apart from the finding in Fergana Valley. Its status is unknown: no plants were found at the same place in 2003 and no observations were made since then

(P. V. Veselova, pers. comm.). Regarding our case, the species was first found by O. T. Turginov in spring 2023 and was locally common as a weed on cotton fields, their margins and at roadsides (Fig. 1A); in 2024 a number of individuals visibly increased and the population stretched ca. 2.5 km along the road. According to local farmers, they noticed *Diplotaxis* some three or four years ago and since then it became much more abundant. Thus, there is a high probability that *D. muralis* starts becoming invasive in the region.

Draba kuramensis Junuss.

"Tashkent Region, Akhangaran District, West Tian Shan, Chatkal Range, NE macroslope of mt. Babaytag, middle reaches of right-hand tributary of Ertashsay, 41°10'42.46"N, 70°16'36.13"E, 2110 m a. s. l., rocky and gravelly slopes at the right bank. 25 V 2023. D. A. German" (ALTB); "[The same valley], 41°10'32.12"N, 70°16'29.00"E, 2234 m a. s. l., rocks. 1 VI 2024. D. A. German" (ALTB, TASH; Fig. 1B, C); "[The same valley], upper reaches, 41°10'22.85"N, 70°15'36.00"E, ca. 2740 m a. s. l., rocks at the right bank. 27 VI 2024. D. A. German" (ALTB, TASH); "[Namangan Region, Pap District, West Tian Shan, Chatkal Range], Arashan. [Upper reaches of] Kelinchaksay, 41.295932N, 70.425858E [41°17'45.36"N, 70°25'33.09"E], 3154 m. a. s. l., near the melting snow. 9 VII 2024. № 5. Q. O. Ziyodullayev" (TASH).

This species was described based on and long known from the single gathering from Kurama Range within Tajikistan (Yunusov, 1975, 1978). Subsequently it was reported, without giving exact localities, for Uzbekistanian part of the same range (Tojibaev, 2010). However, we failed to locate such material in TASH, Herbarium of Khujand State University, LE and elsewhere. The presence of *D. kuramensis* in the flora of Uzbekistan is confirmed here based on the above collections from Chatkal Range while its occurrence in Kurama Range within Uzbekistan needs confirmation.

According to Yunusov (1975, 1978), the species is characterized by very small flowers with petals just 1.5–2.5 mm long, subequaling to or slightly exceeding sepals. Our specimens, otherwise indistinguishable from the type of *D. kuramensis* (R. V. Kamelin, 21 VI 1970, № 300; LE 01266819), have petals 4–5 mm long and 2–2.5 times exceeding sepals (Fig. 1C). This discrepancy is purportedly explained by the difference in the development stage of the plants. The type gathering is a fruiting plant with occasional last flowers which often do not reach normal size in Cruciferae and therefore are not representative of the species.

Hirschfeldia incana (L.) Lagr.-Foss.

"Tashkent Region, Bostanliq District, right bank of Pskem about 0.5 km upstream the mouth of Ispaysay, 41°48'33.04"N, 70°14'53.64"E, 984 m a. s. l., roadside. 31 V 2024. D. A. German, Q. O. Ziyodullayev" (ALTB); "Tashkent Region, Buka District, road Buka – Bekabad, ca. 7 km to the south of Buka, 40°44'16.26"N, 69°12'38.48"E, 314 m a. s. l., roadside. 18 VI 2024. D. A. German, F. M. Madaminov" (TASH); "[The same locality], 22 VI 2024. D. A. German" (ALTB); "Tashkent Region, Angren, 40°59'12.05"N, 70°02'01.62"E, 850 m a. s. l., along the highway Tashkent – Osh. 27 VI 2024. D. A. German, Q. O. Ziyodullayev" (ALTB); "[The same locality and ecology], 40°59'27.43"N, 70°02'32.34"E, 1 VII 2024. D. A. German, O. T. Turginov, F. M. Madaminov" (ALTB); "Tashkent, Yashnabad District, Temur-Malik Str. in ca. 1 km from crossing with Parkent Str., 41°18'42.15"N, 69°20'52.35"E, mown loan. 1 VII 2024. D. A. German" (ALTB, TASH; Fig. 1D); "Tashkent, Mirzo Ulugbek District, Ziyolilar Str., near TOMZ bus station, 41°20'13.48"N, 69°19'30.45"E, mown loan. 31 VII 2024. D. A. German" (ALTB).

Within Middle Asia, monotypic genus *Hirschfeldia* Moench was first collected as alien in south-westernmost Turkmenistan in the course of botanical exploration of lower reaches of Atrek in 1946–1947 (Nardina, 1954) and then in 1968 in Kushka (now Serhetabat), ca. 800 km to the east of previous locality (Voytenko, 1969; LE). For more than 60 years *H. incana* was not recorded from other countries of the region until in 2013 it was found in western part of Kyrgyzstan (Lazkov, Sennikov, 2014). The latter authors mentioned presumably ephemeral character of this introduction. This seems not to be the case of Uzbekistan where the plant has been observed and gathered many times in different parts of Tashkent Region during the first year of appearance of the species in the country assuming a burst-like spread immediately after apparently recent introduction. Some findings were represented by a single but well-developed plant, in other cases many plants were observed; a population from Buka District included at least several dozen (probably up to a hundred) of individuals on both sides of the road. Based on these facts it seems likely that *H. incana* will become invasive in Uzbekistan and spread further withing the Middle Asian region.



Fig. 1. Newly recorded mustard species: A – *Diplotaxis muralis* along the road Chust – Kasansa near Shark-Yulduzi after releasing seeds; B, C – *Draba kuramensis* with flowers and unripen fruits on mt. Babaytag; D – *Hirschfeldia incana* on the loan in Tashkent, apparently regenerated after mowing; E – fruiting plant of *Parrya pinnatifida* in the valley of Kunkurmes; F – fruiting plants of *Scapiarabis popovii* on rocks of mt. Babaytag. Photos by D. A. German except for A (by O. T. Turginov) and E (by F. M. Madaminov), design by N. Yu. Beshko.

Lepidium tianschanicum (Botsch. et Vved.) Al-Shehbaz [*Stroganowia tianschanica* Botsch. et Vved.]

"Tashkent Region, Bostanliq District, Ugam Range, upper reaches of Anaulgensay, 42°03'05.90"N, 70°29'49.04"E, 2690 m a. s. l., community of tall herbs on gravelly slope near rocks. 23 VII 2024. D. A. German" (ALTB, TASH).

Infrequently collected species of predominantly W Tian Shanian distribution (German et al., 2013); novelty for Ugam Range.

Mutarda nigra (L.) Bernh. [*Brassica nigra* (L.) W. D. J. Koch]

Makhamov et al. (2024) reported recently this species as naturalized in Uzbekistan. No correctly identified collections of the species from the country and the whole Middle Asia are available at AA, FRU, LE, MW, TASH, and the absence of the species in the region was demonstrated previously (German et al., 2013). We therefore cannot confirm the data of Makhamov et al. (l. c.).

Parrya pinnatifida Kar. et Kir.

"[Qashqadarya Region, Shakhrisabz District], SW Hissar, Hissar State Reserve, vicinities of Gelon. Valley of Kunkurmes. 3420 m a. s. l. 7 VIII 2020. F. M. Madaminov, O. T. Turginov, A. M. Jabborov" (TASH, currently misplaced; Fig. 1E).

This is the second finding of *P. pinnatifida*, otherwise only known from the east of Uzbekistan (Shakhimardan; TASH), from the southern part of the country. The previous record, also from Hissar Range (mt. Khodjapiryakh; Vassiljeva, 1966) was somewhat doubtful since forked trichomes were mentioned, a character unknown in any species of *Parrya* R. Br. (and relevant tribe *Chorisporeae* C. A. Mey.), and Vassiljeva's specimen is still not available for checking. Our gathering fits well the morphology of *P. pinnatifida* and confirms the occurrence of the species in Uzbekistanian part of Hissar Range.

Parrya tojibaevii D. A. German et Madaminov

"[Tashkent Region, Bostanliq District], basin of Chirchiq, left bank, along the left side of temporary tributary of Chirchiq inflowing it 200 meters above Khojikent railway station. 11 IV 1971. [E. G.] Puchkova" (TASH [TASH 054097, 054098], sub nom. *Pseudoclausia mollissima* (Lipsky) A. Vassil.); "[The same locality], 41°37'00.10"N, 69°55'19.12"E, 744 m a. s. l., somewhat bushy (*Atraphaxis seravschanica*, *A. pyrifolia*, *Amygdalus spinosissima*, etc.), NE-exposed slope. 14 V 2024. D. A. German, A. D. Gaziev, F. M. Madaminov" (ALTB, TASH).

While preparing the description of this species, the collection of E. G. Puchkova was not taken into consideration because of having somewhat narrower and more divided leaves than in plants from *locus classicus* and surroundings [more typical for *P. mollissima* (Lipsky) D. A. German et Al-Shehbaz], and it was decided to double-check the identity of relevant specimens. As our subsequent field study showed, plants from Khojikent definitely belong to *P. tojibaevii*. This population is most remote from the others, all of which are concentrated around the confluence of Chatkal River with Charvak Reservoir (German et al., 2024). Although the distance is not big (ca. 15 km along the bank), in view of the very compact area of the species it is a sufficient expansion of the knowledge on its range.

Scapiarabis popovii (Botsch. et Vved.) M. Koch et al. [*Arabis popovii* Botsch. et Vved.]

"Tashkent Region, Bostanliq District, Chatkal Range, watershed between valleys Beldersay and Amirsay, 41°28'12.65"N, 69°57'49.82"E, ca. 2270 m a. s. l., rocks. N. Yu. Beshko, B. I. Nazarov, D. A. German" (ALTB, TASH); "Tashkent Region, Akhangaran District, NE macroslope of mt. Babaytag, upper reaches of right-hand tributary of Ertashsay, 41°10'24.85"N, 70°15'58.16"E, 2550 m a. s. l., rocks at the left bank. 27 VI 2024. D. A. German, Q. O. Ziyodullayev" (ALTB, TASH; Fig. 1F).

Scapiarabis popovii is a rare species hitherto known from six gatherings (LE, TASH), four of which are cited in the protologue (Botschantzev, Vvedensky, 1948). All these localities are confined to a small area in the central part of transboundary Karzhantau Range where it was collected last time in 1959 (the relevant gathering from upper reaches of Karzhansay is the only Kazakhstanian locality; others belong to adjacent Uzbekistan). Our findings considerably expand the known distribution range of the species since they stand ca. 30 and 70 km to the south-east from the previously described area of *S. popovii* and belong to both northern (basin of Chirchik) and southern (basin of Akhangaran) macroslopes of Chatkal Range. Thus, according to the scheme of phytochoria of Uzbekistan used in the new edition of the national Flora (Sennikov et al., 2016; Tojibaev et al., 2017), the species is distributed not only in Ugam-Pskem, but also in Western Chatkal and Kurama regions of the Western Tian Shan district of Middle Asian Mountain phytogeographical province.

Sisymbrium officinale (L.) Scop.

"Tashkent Region, Akhangaran District, lower reaches of the river Akcha at the cross with highway Tashkent – Osh, 40°55'06.10"N, 69°50'02.54"E, 698 m a. s. l., pebble at the left bank. 26 IV 2024. D. A. German" (ALTB, TASH).

This is the second record of this alien species from Uzbekistan that is quite close to the first one (village Akcha: German, 2024) where it was collected in 2000. The new finding demonstrates that *S. officinale* tends to be naturalized in Uzbekistan.

Sisymbrium orientale L.

Uzbekistan: "[Jizzakh Region, Zaamin District], western Pamir-Alay, Golodnaya Steppe [Mirzachul], crossing of the road Khavast – Jizzakh with railway before Zaamin, 360 m a. s. l. 21 IV 2023. I. I. Maltzev" (TASH, sub nom. *S. irio* L.); "[Fergana Region], road Kokand – Fergana, gardens. 30 IV 2023. I. I. Maltzev" (TASH, sub nom. *S. altissimum* L.); "Fergana Region, Beshariq District, vicinities of Yaypan [south of Rapkan], 40°18'26.9"N, 70°41'23.41"E, 678 m a. s. l. № 1034. 21 IV 2023. Sheraliyev O. Kh." (TASH); "[The same locality, date and collector], 40°18'33.09"N, 70°41'13.08"E, 632 m a. s. l. № 1035" (TASH); "[The same locality, date and collector], 40°18'31.13"N, 70°38'58.82"E, 606 m a. s. l. № 1054" (TASH); "Tashkent Region, Qibray District, vicinities of May (Mayskiy), 41°28'49.89"N, 69°28'49.62"E, 557 m a. s. l., wasteland slope along the road. 17 IV 2024. N. Yu. Beshko, D. A. German, F. M. Madaminov" (ALTB); "Tashkent Region, Akhangaran District, highway Tashkent – Almalyk, vicinities of Balgali, 40°58'55.54"N, 69°32'23.98"E, 460 m a. s. l., roadside. 28 IV 2024. D. A. German, I. Yu. Selyutina, D. E. Turdiev" (ALTB, TASH); "Jizzakh Region, Farish District, shore of the lake Tuzkan, northern piedmonts of Pistalitau, 40.54696N, 67.391091E [40°32'49.06"N, 67°23'27.93"E], 246 m a. s. l. 9 V 2024. N. Yu. Beshko" (TASH); "Surkhandarya Region, Shurchi District, Laylapkhona, 38°00'09.63"N, 67°51'16.35"E, 390 m a. s. l., along the ditch and at the roadside. 11 V 2024. D. A. German, B. Q. Karimov, Q. O. Ziyodullayev, K. U. Atoyev" (ALTB, TASH); "Surkhandarya Region, Boysun District, Sairob, 38°04'37.15"N, 66°57'57.49"E, 950 m a. s. l., roadside. 11 V 2024. D. A. German, B. Q. Karimov, Q. O. Ziyodullayev, K. U. Atoyev" (ALTB). Tajikistan: "Sughd Region, Khujand, ca. 40°18'09"N, 69°37'07"E, 390 m a. s. l., Tashkent Ave., vicinities of Khujand State University, roadside and wasteland. 21 VI 2024. D. A. German" (ALTB, TASH).

The situation with alien *S. orienale* in Uzbekistan is similar to that demonstrated by *Hirschfeldia incana*: never found here before 2023, it is already collected in four regions from different parts of the country apparently revealing a tendency of becoming invasive (Fig. 2A). It is also recorded here for the first time from Tajikistan and above-said seems to be true for this country, too: according to our observations in June 2024, it is very common in Khujand occupying ruderal habitats and being represented by hundreds of individuals, mostly setting seeds. Judging from the image referred to *S. brassiciforme* C. A. Mey. in the "Illustrated flora of Tajikistan" (Nowak et al., 2020) which belongs to *S. orientale*, the appearance of the species in Tajikistan seems to predate that in Uzbekistan.

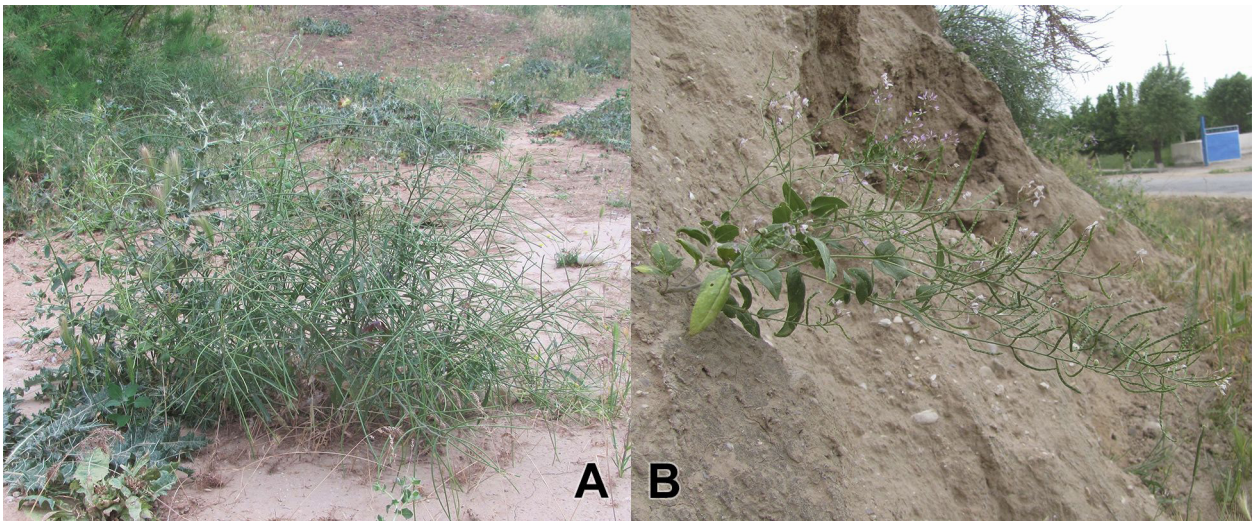


Fig. 2. Findings in Laylapkhona: A – weedy *Sisymbrium orientale* with formed fruits; B – *Strigosella latifolia*. Photos by D. A. German, design by N. Yu. Beshko.

In our last year communication (German et al., 2023), while proving that previous reports of *S. orientale* for Turkmenistan are based on old misidentified collections, we came to a conclusion that the species does not occur in this country. Unfortunately, an image by A. V. Pavlenko taken in 2016 and identified by A. L. Ebel, available on "Plantarium" [2007+] (Pavlenko, 2016) was not considered at that time, but it certainly confirms the recent presence of *S. orienale* in Turkmenistan. Thus, like in the case of *Hirschfeldia incana*, the invasion of eastern rocket in Middle Asia has begun from Turkmenistan; its future records from Kazakhstan and Kyrgyzstan are quite expected.

Strigosella latifolia Bondar. et Botsch.

"Surkhandarya province, Shurchi district, vicinities of Laylapkhona. N37.941188, E67.848258. 8 III 2020. O. T. Turginov, S. O. Pulatov" (TASH [TASH 00201939], sub nom. *S. turkestanica* (Litv.) Botsch.); "[The same locality], 38°00'09.63"N, 67°51'16.35"E, 390 m a. s. l., gray clayey slope. 11 V 2024. D. A. German, B. Q. Karimov, Q. O. Ziyodullayev, K. U. Atoyev" (ALTB, TASH).

Strigosella latifolia is endemic to SW Pamir-Alay that was recently recorded from Uzbekistan (German, 2024). Gatherings from Laylapkhona (Fig. 2B) bridge the gap between the first Uzbekistanian finding (vicinities of Omonhkona) and previously known Tajikistanian localities.

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REFERENCES / ЛИТЕРАТУРА

Abdulina S. A. 1999. *Checklist of vascular plants of Kazakhstan*. Ed. by R. V. Kamelin. Almaty: Steka. 187 pp. [In Russian] (***Абдулина С. А.*** Список сосудистых растений Казахстана / Под ред. Р. В. Камелина. Алматы: «Стека», 1999. 187 с.).

Aralbay N. K., Mukhtubayeva S. K., Shormanova A. A., Danilov M. P., Zakirova R. O. 2007. *Gosudarstvennyy kadastr rasteniy Zhambylskoy oblasti. Konspekt vidov vysshikh sosudistykh rasteniy. Kniga pervaya* [*State cadastre of plants of Jambyl Province. Checklist of higher vascular plants. First book*]. N. K. Aralbay (ed.). Almaty. 516 pp. [In Kazakh and Russian] (***Аралбай Н. К., Мухтубаева С. К., Шорманова А. А., Данилов М. П., Закирова Р. О.*** Государственный кадастр растений Жамбылской области. Конспект видов высших сосудистых растений. Книга первая / Под ред. Н. К. Аралбая. Алматы, 2007. 516 с.).

Aralbayev N. K., Kudabayeva G. M., Vesselova P. V., Danilov M. P., Zakirova R. O., Nelina N. V., Zhamangara A. K., Nigmatova S. A., Samoylova V. A., Shadrina N. V., Mukhtubayeva S. K., Kurmantayeva A.A., Isayev E. B., Sikhymbayev A. E. 2002. *Gosudarstvennyy kadastr rasteniy Juzhno-Kazakhstanskoy oblasti. Kniga pervaya. Konspekt vidov vysshikh sosudistykh rasteniy* [*State cadastre of plants of South-Kazakhstanian Province. First book. Checklist of higher vascular plants*]. N. K. Aralbayev (ed.). Almaty: Gylym. 314 pp. [In Russian] (***Аралбаев Н. К., Кудабаева Г. М., Веселова П. В., Данилов М. П., Закирова Р. О., Нелина Н. В., Жаманғара А. К., Нигматова С. А., Самойлова В. А., Шадрина Н. В., Мухтубаева С. К., Курмантаева А. А., Исаев Е. Б., Сихымбаев А. Е.*** Государственный кадастр растений Южно-Казахстанской области. Книга первая. Конспект видов высших сосудистых растений / Под ред. Н. К. Аралбаева. Алматы: Гылым, 2002. 314 с.).

Botschantzev V. P., Vvedensky A. I. 1948. Cruciferae novae ex Asia Media. *Not. Syst. Herb. Inst. Bot. Zool. Acad. Sci. Uzbekistan.* [*Bot. Mater. Gerb. Inst. Bot. & Zool. Akad. Nauk UzSSR*] 12: 3–12. [In Russian] (***Бочанцев В. П., Введенский А. И.*** Новые крестоцветные из Средней Азии // Бот. мат. Герб. Ин-та бот. и зоол. АН УзССР, 1948. Т. 12. С. 3–12).

Ebel A. L., Kupriyanov A. N., Khrustaleva I. A., Pyak A. I., Gudkova P. D., Nobis M. 2015. New records to the vascular flora of Kazakhstan (Central Asia). *Polish Bot. J.* 60(2): 191–195.

Ebel A. L., Lashchinskiy N. N., Safarov N. M., Shchegoleva N. V. 2020. Contribution to the flora of Tajikistan (alien plants). *Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ.* [*Systematic notes on the materials of P. N. Krylov Herbarium of Tomsk State University*] 122: 37–44. [In Russian] (***Эбель А. Л., Лащинский Н. Н., Сафаров Н. М., Щёголева Н. В.*** Дополнение к флоре Таджикистана (чужеродные растения) // Сист. зам. Герб. Томск. ун-та, 2020. Т. 122. С. 37–44).

German D. A. 2024. New state records and deletions of Cruciferae in the Middle Asian region and surroundings. *Turczaninowia* 27, 2: 192–203. DOI: 10.14258/turczaninowia.27.2.18

German D. A., Lazkov G. A., Tojibaev K. Sh., Neveraev U. A. 2013. New data on diversity and geography of the mustards (Cruciferae) in Kyrgyzstan and Uzbekistan. *Bot. Zhurn.* 98(9): 1166–1175. [In Russian] (***Герман Д. А., Лазьков Г. А., Тожибаев К. Ш., Невераев У. А.*** Новые данные по видовому составу и распространению крестоцветных (Cruciferae) Киргизии и Узбекистана // Бот. журн., 2013. Т. 98, № 9. С. 1166–1175).

German D. A., Madaminov F. M., Beshko N. Yu. 2024. A new, highly endangered and restricted-range species of *Parrya* sect. *Pseudoclausia*, comb. nov. (Brassicaceae) from Western Tian Shan, Uzbekistan. *Phytotaxa* 633(2): 145–154. DOI: 10.11646/phytotaxa.633.2.5

German D. A., Ruzimatov R. Yo., Hoshimov H. R. 2023. On the occurrence of *Sisymbrium orientale* (Cruciferae) in Middle Asia. *Turczaninowia* 26, 4: 105–110. DOI: 10.14258/turczaninowia.26.4.16

Jonsell B. 1973. Taxonomy and distribution of *Rorippa* (Cruciferae) in the southern U.S.S.R. *Svensk. Bot. Tidskr.* 67: 281–302.

Khatri K. S. 1989. *Cardamine* L. sect. *Cardamine* (Cruciferae) in the Asian territory of Soviet Union. A morphological, anatomical and phylogenetical study with taxonomic reconsiderations. *Feddes Repert.* 100(3–4): 81–96.

Khatri K. S. 1990. *Cardamine* L. sect. *Macrophyllum* O. E. Schulz (Cruciferae Juss.) in the Asian territory of the Soviet Union. A morphological, anatomical and phylogenetical study with taxonomic revision. *Folia Geobot. Phytotax.* 25(2): 197–215.

Kovalevskaya S. S. 1974. *Brassica* L. In: A. I. Vvedensky, M. G. Pachomova (eds.). *Conspectus florae Asiae Mediae*. Vol. 4. Taschkent: Editio Academiae Scientiarum UzSSR. Pp. 180–182. [In Russian] (***Ковалевская С. С.*** *Brassica* L. – Капуста // Определитель растений Средней Азии / Под ред. А. И. Введенского, М. Г. Пахомовой. Т. 4. Ташкент: Изд-во «ФАН» УзССР, 1974. С. 180–182).

Lazkov G. A., Sennikov A. N. 2014. New records in vascular plants alien to Kyrgyzstan. *Biodiv. Data J*. 2: e1018.

Makhkamov T., Kortz A., Hejda M., Brundu G., Pyšek P. 2024. Naturalized alien flora of Uzbekistan: species richness, origin and habitats. *Biol. Invasions* 26(9): 2819–2830.

Nardina N. S. 1954. Sketches of the vegetation of lower reaches of Atrek. *Trudy instituta biologii Akademii nauk Turkmenskoy SSR. Seriya botanicheskaya* [*Proceedings of the Institute of Biology of Academy of Sciences of Turkmen SSR*] 2: 116–154. [In Russian] (***Нардина Н. С.*** Очерки растительности нижнего течения Атрека // Труды института биологии АН Туркменской ССР. Сер. ботан., 1954. Т. 2. С. 116–154).

Nowak A., Nobis M., Nowak S., Nobis A., Wrobel A., Świerszcz S., Klichowska E., Dembicz I., Kusza G. 2020. *Illustrated fora of Tajikistan and adjacent areas*. Warsaw, Cracow and Opole: Polish Academy of Sciences, Botanical Garden, Center for Biological Diversity Conservaton & Polish Botanical Society, 2020. 766 pp.

Pavlenko A. V. Image of *Sisymbrium orientale* L. In: *Plantarium*. *Plants and lichens of Russia and neighboring countries: open online galleries and plant identification guide*. URL: https://www.plantarium.ru/page/image/id/439751.html (Accessed 30 April 2024).

Plantarium [2007+]. *Plants and lichens of Russia and neighboring countries: open online galleries and plant identification guide*. URL: https://www.plantarium.ru (Accessed 30 April 2024).

Popov M. G. 1924. Cruciferae. In: M. G. Popov (ed.). *Opredelitel rasteniy okrestnostey Tashkenta* [*Key for Plants of Environments of Tashkent*]. Tashkent: Botanical Institute of the Middle Asian State University. Pp. 137–160. [In Russian] (***Попов М. Г.*** Cruciferae. Крестоцветные // Определитель растений окрестностей Ташкента / Под ред. М. Г. Попова. Ташкент: Бот. ин-т Средне-Азиатск. гос. ун-та, 1924. С. 137–160).

Sennikov A. N. (ed.) 2023. *Flora of Uzbekistan*. Vol. 6. Tashkent: Ma'naviyat Publishers. xiv + 209 pp. [In Russian] (***Сенников А. Н.*** (ред.). Флора Узбекистана. Т. 6. Ташкент: «Маънавият», 2023. xiv + 209 с.).

Sennikov A. N., Tojibaev K. Sh. (eds.). 2021. *Checklist of vascular plants of the Tian-Shan Mountain System*. Pocheon: Korea National Arboretum. 607 pp.

Sennikov A. N., Tojibaev K. Sh., Khassanov F. O., Beshko N. Yu. 2016. The Flora of Uzbekistan project. *Phytotaxa* 282(2): 107–118.

Shermatov G. M. 1974. *Cardamine* L. In: A. I. Vvedensky, M. G. Pachomova (eds.). *Conspectus florae Asiae Mediae*. Vol. 4. Taschkent: Editio Academiae Scientiarum UzSSR. Pp. 83–84. [In Russian] (***Шерматов Г. М.*** *Cardamine* L. – Сердечник // Определитель растений Средней Азии / Под ред. А. И. Введенского, М. Г. Пахомовой. Т. 4. Ташкент: Изд-во «ФАН» УзССР, 1974. С. 83–84).

Sinskaya E. N. 1939. *Brassica* L. In: V. L. Komarov (ed.). *Flora URSS* [*Flora of USSR*]. Vol. 8. Mosqua & Leningrad: Editio Academiae Scientiarum URSS. Pp. 459–466. [In Russian] (***Синская Е. Н.*** Капуста – *Brassica* L. // Флора СССР / Под ред. В. Л. Комарова. Т. 8. М.-Л.: Изд-во АН СССР, 1939. С. 459–466).

Tillaev T. S., Gaziev A. D. 2021. Flora of native plants of the village of Ulugbek and sanitary protection zone INP AS RUz. *Uzbek Biol. J.* 2021, 5: 17–23. [In Russian] (***Тиллаев Т. С., Газиев А. Д.*** Флора аборигенных растений посёлка Улугбек и санитарно-защитной зоны ИЯФ АН РУз // Узбек. биол. журн., 2021. Т. 2021, № 5. С. 17–23).

Tojibaev K. Sh. 2010. *Flora Yugo-Zapadnogo Tian-Shanya (v predelakh Respubliki Uzbekistan)* [*Flora of the southwestern Tian Shan (within the Republic of Uzbekistan)*]. Tashkent: "Fan" Publishers. 98 pp. [In Russian] (***Тожибаев***

К. Ш. Флора Юго-Западного Тянь-Шаня (в пределах Республики Узбекистан). Ташкент: Изд-во «Фан», 2010. 98 с.).

Tojibaev K. Sh., Beshko N. Yu., Popov V. A., Jang C. G., Chang K. S. 2017. *Botanical Geography of Uzbekistan*. Pocheon: Korea National Arboretum. 250 pp.

Vasilyeva A. N. 1961. Cruciferae Juss. In: N. V. Pavlov (ed.). *Flora Kazakhstana* [*Flora of Kazakhstan*]. Vol. 4. Alma-Ata: Publishers of Academy of Sciences of Kazakh SSR. Pp. 171–339. [In Russian] (***Васильева А. Н.*** Крестоцветные – Cruciferae Juss. // Флора Казахстана / Под ред. Н. В. Павлова. Т. 4. Алма-Ата: Изд-во АН КазССР, 1961. С. 171–339).

Vasilyeva A. N. 1969. Cruciferae Juss. In: V. P. Goloskokov (ed.). *Illyustrirovannyy opredelitel rasteniy Kazakhstana* [*Illustrated key for plants of Kazakhstan*]. Vol. 1. Alma-Ata: Nauka Press of Kazakh SSR. Pp. 410-474. [In Russian] (***Васильева А. Н.*** Крестоцветные – Cruciferae Juss. // Иллюстрированный определитель растений Казахстана / Под ред. В. П. Голоскокова. Т. 1. Алма-Ата: Изд-во «Наука» КазССР. С. 410–474).

Vassiljeva L. I. 1966. De plantis novis et raris florae Hissari occidentalis [On new and rare plants of western Hissar]. *Novit. Syst. Pl. Vasc.* [*Novosti Sist. Vyssh. Rast.*] 3: 241–248. [In Russian] (***Васильева Л. И.*** О новых и редких видах Западного Гиссара // Новости сист. высш. раст., 1966. Т. 3. С. 241–248).

Veselova P. V. 2004. Record of *Diplotaxis muralis* (Brassicaceae) in the Western Kazakhstan. *Bot. Zhurn.* 89(4): 669–671. [In Russian] (***Веселова П. В.*** Находка *Diplotaxis muralis* (Brassicaceae) в Западном Казахстане // Бот. журн., 2004. Т. 89, № 4. С. 669–671).

Voytenko V. F. 1969. New location of *Hirschfeldia incana* (L.) Lagr.-Foss. in Turkmenia and some points of its carpoecology. *Izv. Acad. Nauk Turkmensk. SSR. Ser. Biol. Nauk.* 5: 79–81. [In Russian] (***Войтенко В. Ф.*** Новое местонахождение *Hirschfeldia incana* (L.) Lagr.-Foss. в Туркмении и некоторые вопросы её карпоэкологии // Изв. АН ТССР. Сер. биол. наук, 1969. № 5. С. 79–81).

Yunusov S. Yu. 1975. New species of genus *Draba* L. from Northern Tajikistan. *Dokl. Akad. Nauk Tadzhiksk. SSR* 18, 7: 50–51. [In Russian] (***Юнусов С. Ю.*** Новый вид рода *Draba* L. из Северного Таджикистана // Докл. АН ТаджССР, 1975. Т. 18, № 7. С. 50–51).

Yunusov S. Yu. 1978. *Cardamine* L.; *Draba* L. In: P. N. Ovczinnikov (ed.). *Flora Tadzhikskoy SSR* [*Flora of Tajik SSR*]. Vol. 5. Leningrad: Nauka. Pp. 76–77, 189–209. [In Russian] (***Юнусов С. Ю.*** Сердечник – *Cardamine* L.; Крупка – *Draba* L. // Флора Таджикской ССР / Под ред. П. Н. Овчинникова. Т. 5. Л.: Наука, 1978. С. 76–77, 189–209).