The genus *Camelina* (Cruciferae) in Mongolia and China reviewed on the basis of herbarium materials from the Institute of General and Experimental Biology of the ASM (UBA) and the Komarov Botanical Institute (LE)

Род рыжик – *Camelina* (Cruciferae) Монголии и Китая по материалам гербариев Института общей и экспериментальной биологии АНМ (UBA) и Ботанического института им. В.Л. Комарова РАН (LE)

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Herbarium collections of the genus *Camelina* preserved at the Institute of General and Experimental Biology of the Academy of Sciences of Mongolia (UBA) and the Komarov Botanical Institute of the Russian Academy of Sciences (LE) were studied. The collections of these Herbaria contain materials of 3 species from Mongolia (*C. caucasica* (Sinsk.) Vass., *C. sativa* (L.) Crantz, *C. sylvestris* Wallr.) and 4 from China (*C. sativa*, *C. linicola* Schimp. et Spenn., *C. microcarpa* Andrz., C. *sylvestris*).

Key words: *Camelina microcarpa*, *Camelina sylvestris*, *Camelina sativa*, *Camelina linicola*, *Camelina caucasica*, Brassicaceae, geographical distribution.

Изучены гербарные коллекции рода *Camelina* Crantz (Cruciferae) Института общей и экспериментальной биологии АНМ (UBA) и Ботанического института имени В.Л. Комарова РАН (LE). В фонтах упомянутых гербариев хранятся материалы по трем (*C. caucasica* (Sinsk.) Vass., *C. sativa* (L.) Crantz, *C. sylvestris* Wallr.) видам этого рода из Монголии и четырем (*C. sativa*, *C. linicola* Schimp. et Spenn., *C. microcarpa* Andrz., *C. sylvestris*) с территории Китая.

Ключевые слова. *Camelina microcarpa*, *Camelina sylvestris*, *Camelina sativa*, *Camelina linicola*, *Camelina caucasica*, Brassicaceae, географическое распространение.

To discuss the species diversity within the genus *Camelina* Crantz in Mongolia and China, we studied not very large herbarium holding at the Institute of General and Experimental Biology of the Academy of Sciences of Mongolia (UBA, Ulaanbaatar) and the Komarov Botanical Institute of the Russian Academy of Sciences (LE, St. Petersburg). At the same time, these collections made it possible to clarify the diversity of *Camelina* spp. in the Mongolian and Chinese florae. Some gaps were filled in the species diversity of Mongolia. The most recent regional revision of cruciferous plants in Mongolia (German, 2015) did not cite *C. caucasica* (Sinsk.) Vass. The diversity of *Camelina* spp. in the Chinese vegetation was doubled: previously, only two species had been recognized (Zhou et al., 2001).

Supplements to the *Camelina* diversity in East Asia are primarily associated with the still remaining ignorance about the existing morphological boundaries between the pairs of species: *C. microcarpa* Andrz. with *C. sylvestris* Wallr., and *C. sativa* (L.) Crantz with *C. linicola* Schimp. et Spenn., although they are clearly obvious not only from the type specimens.

The diversity of the genus *Camelina* is not too convincingly exposed in the discussions on geographical and phylogenetic data contained in a quite recent publication by Žerdoner Čalasan et al. (2019). The authors expressly emphasized the rather strange variations in *C. microcarpa* (as they understood them): for example, 4 ribotypes (two western and two eastern), and *C. sativa* which was represented in the said publication by two ribotypes. In fact, those studies showed a clearly manifested, geographically and phylogenetically determined richness of species within *C. microcarpa* aggr., once described as ser. *Microcarpae*, and later recognized as a section (Dorofeyev, 1996; 2019).

No less obvious is the species diversity of *C. sativa* aggr. (ser. *Camelina*) (Dorofeyev, 1996). It is impossible not to notice this fact while scrutinizing the cited publication. A drawback in the study by the previous authors is that *C. rumelica* Velen. was incorporated into the diversity of *C. microcarpa*, which is detrimental to the true understanding of the diversity of the genus in question and does not allow the readers to see and evaluate its general structure.

The genus *Camelina* is not natural for Mongolia or China. This fact is obvious not only from the records on the herbarium sheets at LE and UBA, but also from the results of our long-term observations in Siberia and Mongolia. Anthropogenically introduced adventive plants, scantily represented in both herbaria at Ulaanbaatar and St. Petersburg, still reflect the existing, albeit small, diversity of species whose morphological information is not yet available in old or new publications containing reviews of these cruciferous plants in these two countries (Grubov, 1982; Zhou et al., 2001; German, 2009; 2015; etc.).

It was established on the basis of herbarium materials reviewed in the said publication that the *Camelina* diversity in East and Central Asia comprises 5 species: *C. microcarpa*, *C. sylvestris*, *C. sativa*, *C. linicola* and *C. caucasica*. The first two are not very frequent elements of the segetal flora. Their renewal and existence in plant communities take place in a natural way.

The remaining three species (cultivars) cannot independently and constantly reproduce themselves in the mentioned florae. Over time, their presence in these florae, due to natural reasons, declines, and without proper concomitant agricultural practices they can die out within a few years. These processes are quite evident, for example, in Eastern Europe, where in the late 20th century *Camelina* had not been planted as an oilseed crop for decades.

The morphological features that distinguish the discussed species are quite obvious, although they are constantly ignored (Žerdoner Čalasan et al., 2019). For example, *C. microcarpa* and *C. sylvestris* have relatively small pear-shaped fruits. In the first species, the top of the fruit is succise, in the second one it is attenuate.

Unlike the previous species, the fruit of *C. sativa* is 1.5 times larger than theirs and slightly attenuated at the top. *C. caucasica* has a distinctive fruit, depressed at the sides, deformed from side of the frame, slightly attenuated from above. This feature in the fruit structure evolved, on the one hand, in the process of the fruit's asymmetric development, and on the other, as a result of targeted selection of thin-valve forms, most convenient for threshing. In contrast to *C. caucasica*, the fruit of *C. linicola* is characterized by a markedly blunted tip of the silicle.

***Camelina* Crantz**

1. *C. linicola* Schimp. et Spenn.

[Северо-восточный Китай] Маньчжурия, ст. Туаченту Кит[итайско]-В[осточной] ж[елезной] д[ороги], 16 VII 1905, П. Егоров (LE!) [China, Manchzhuria, Tauchentu Railway Station, 16 VII 1905, P. Egorov]

2. *C. caucasica* (Sinsk.) Vass.

[Монгольская Народная Республика] Ховсгол аймаг, Хонгор бригад, Туршлагын талвай, Тариалангийн с.а.а. (UBA!) [Mongolia, Khovsgol Aimak]

Монгольская Народная Республика, Центральный аймак, Бату Сумбур сомон, долина р. Хары близ сомона, опытный пункт Комитета наук, комплексные луга в пойме р. Хары, VII 1944, В. Ф. Шубин (LE!) [Mongolia, Central'nyi Aimak, Batu Sumbur Somon, VII 1944, V. F. Shubin]

[Монгольская Народная Республика] Монгол Дагуур: Сэлэгэ аймаг, Дарханы с.а.а., тариалангийн талбайгаас, 10 VIII 1966, Г. Цэрэнбалжид, И. Санчир (UBA!) [Mongolia, Selenge Aimak, Darkhany Somon, 10 VIII 1966, G. Cerenbalzhin, I. Sanchir]

3. *C. sativa* (L.) Crantz

[Северо-восточный Китай] Маньчжурия, бл. ст. ж.д. Цунь, 26 VI 1902, №1018, Д. Литвинов (LE!) [China, Manchzhuria, Cun' Railway Station, 26 VI 1902, D. Litvinov]

[Северо-восточный Китай] Маньчжурия, западн. Хангайские горы, бл. ст. ж.д. Джалантунь, сорное, 14 VIII 1902, №2558, Д. Литвинов (LE!) [China, Manchzhuria, West of Khangaj Mnts, Dzhalangun' Railway Station, 14 VIII 1902, №2558, D. Litvinov]

КНР [Китайская Народная Республика, Манчжурия], Хэйлунцзянская пров., уезд Хума, около дер. Ванхада, 210 м, на берегу речки под горой, 15 VII 1950, №136, Chu Yu-chang, Chao Ta-chang (LE!) [China, Manchzhuria, Kheilunczjanskaja Prov., Khuma Diestr., Vankhada Village, 15 VII 1950, №136, Chu Yu-chang, Chao Ta-chang].

Монгольская Народная Республика, Арахангайский аймак, Тувшурульх сомон, государственное животноводческое хозяйство в 45 км к юго-востоку от аймака, посевы, 14 VIII 1951, А. В. Калинина (LE!) [Mongolia, Arakhangaj Aimak, Tuvshuryl'kh Somon, 14 VIII 1951, A. V. Kalinina]

4. *C. sylvestris* Wallr.

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, … Kuldscha, 30 VI 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, … Kuldscha, 30 VI 1877, A. Regel]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, … Kutentass, 14 IV 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, … Kutentass, 14 IV 1877, A. Regel]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Chojur-Sumun nidl. … Kuldscha, 27 V 1877, A. Regel (LE!) [China, Dzhungaria]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Linke Iliseite nidwestl. … Kuldscha, 29 V 1877, A. Regel (LE!) [China, Dzhungaria]

Синьцзянская комплексная экспедиция Академии наук Китайской Народной Республики 1956-1959 г.г. Китайская Народная Республика, Синьцзян-Уйгурская автономная область, В. Тынь-Шань, сев. склон г. Урумчи, дол. р. Урумчинки, близ гост[иницы] «Урумчи», галечная надлуговая терраса, среди посадки *Ulmus pumila*, 30 VI 1957, №10А, А. А. Юнатов (LE!) [China, Sincshan'-Ungur Autonomic Prov., Urumchi, 30 VI 1957, №10A, A. A. Yunatov]

Почвенно-агрономический отряд Монгольской экспедиции Академии наук СССР. Сев. Монголия, среднее течение р. Селенги, поля госхоза им. Коминтерн, в посеве овса на 3 террасе, 13 VIII 1931, №128, Н. Л. Десяткин (LE!) [Mongolia, average flow of Selenga River, 13 VIII 1931, №128, N. L. Desjatkin]

Монгольская Народная Республика, Хобдосский аймак, Булугун сомон, хр. Байтаг-Богдо-нуру, северный склон, ущелье Улясту гола, в 3-4 км от устья, по берегу у воды, 18 IX 1948, №5524, В. И. Грубов (LE!) [Mongolia, Bulugun Somon, Baitag-Bogdo-nuru Range, 18 IX 1948, №5524, V. I. Grubov]

[Монгольская Народная Республика] Монгол Дагуур: Сэлэнгэ аймаг, Шаамар сум-нэгдал, …… , 25 VI 1977, №1257, Б. Мощак, Ш. Дариймаа (UBA!) [Mongolia, Selenge Aimak, Shaamar Somon, 25 VI 1977, №1257, B. Mostchak, Sh. Darimaa]

5. *C. microcarpa* Andrz.

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Kuldscha, 3 V1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, Kuldscha, 3 V 1877, A. Regel]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, pr. Kuldscha, 8 V 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, pr. Kuldscha, 8 V 1877, A. Regel] (2 specimena)

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Piluschi, bei Kuldscha, 17 V 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, pr. Kuldscha, 17 V 1877, A. Regel]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Chojur-Sumun ad fl. Ili, 27 V 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, Chojur-Sumun ad fl. Ili, 27 V 1877, A. Regel]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Kuldscha, 30 VI 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, Kuldscha, 30 VI 1877, A. Regel] (3 specimena)

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Dschagastai, 7 VIII 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, Dschagastai, 7 VIII 1877, A. Regel]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Kuldscha, 12 VI 1877, A. Regel (LE!) [China, Dzhungaria, Iter Turkestanicum, Kuldscha, 12 VI 1877, A. Regel]

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