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)

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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.

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* ssp. in the Mongolian and Chinese floras. 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* ssp. 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 different 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 Žerdoněr Čalasen 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, scantly 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 (Zerdoner Calasan 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, and 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, 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 silique.

Camelina Crantz

1. C. linicola Schimp. et Spenn.

[Sеверо-восточный Китай] Маньчжурия, ст. Тучан-ту [Китайская] -Восточной] -железнодорожной] [дороги], 16 VII 1905, П. Егоров (LE!) [China, Manchzhuaria, Tauchentu Railway Station, 16 VII 1905, P. Egorov]

2. C. microcarpa (Sinsk.) Vass.

[Монгольская Народная Республика] Ховсголь аймаг, Хонгор бригад, Туранзаган талай, Тарылгандын с.а.а. (UBA!) [Mongolia, Khovsgol Aimag]

Монгольская Народная Республика, Центральный аймаг, Бату Сумбурс 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 Дагу-ур: Сэлэнгэ аймаг, Дарханы с.а.а., тарылгандын талбайгаас, 10 VIII 1966, Г. Цээрэнбайжид, И. Сачир (UBA!) [Mongolia, Selenge Aimag, Darkhan Somon, 10 VIII 1966, G. Cerenbalzhin, I. Sanchir]

3. C. sativa (L.) Crantz

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

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

КНР [Китайская Народная Республика, Маньчжурия], Хэйлунцзянская пров., уезд Хума, около дер. Ван-ханда, 210 м, на берегу реки под горой, 15 VII 1950, №136, Чу Yu-chang, Chao Ta-chang (LE!) [China, Manchzhuaria, Heilunzjanska Prov., Khuma Diestr., Vankhad Village, 15 VII 1950, №136, Chu Yu-chang, Chao Ta-chang].

Монгольская Народная Республика, Араханскайский аймак, Тувшуурхэл сомон, государственное животноводческое хозяйство в 45 км к юго-востоку от аймака, посены, 14 VIII 1951, А. В. Калинин (LE!) [Mongolia, Arahkangai Aimag, Tuvshuryr'kh Somon, 14 VIII 1951, A. V. Kalinin]

4. C. sylvestris Wallr.

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

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

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Chojur-Suman nd. ... Kulscha, 27 V 1877, A. Regel (LE!) [China, Dzungaria]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Linke Illeseite midwestl. ... Kulscha, 29 V 1877, A. Regel (LE!) [China, Dzungaria]

Синьцзянская комплексная экспедиция Академии наук Китайской Народной Республики 1956-1959 гг. Китайская Народная Республика, Синьцзян-Уйгурская автономная область, В. Тынь-Шань, сев. склон г. Урумчи, дол. р. Урумчики, близ гостилицы "Урумчи", галечная надлуговая терраса, среди посадок Ulmus pumila, 30 VI 1957, №10A, А. А. Юнатов (LE!) [China, Sincshsan'-Ungur Autonom-Prov., Urumchi, 30 VI 1957, №10A, A. A. Yunatov]

Почво-агрономический отряд Монгольской экспедиции Академии наук СССР. Сев. Монголия, среднее течение р. Селенга, поля грозовых им. Комитен, в пос. Ван 13 VIII 1931, №128, Н. Л. Дезяткин (LE!) [Mongolia, average flow of Selenga River, 13 VIII 1931, №128, N. L. Desjatin]

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

Монгольская Народная Республика Монгол Дагу-ур: Сэлэнгэ аймаг, Шаамар сум-эдzagдл, ..... 25 VII 1957, №1257, Б. Моцац, Ш. Дарима (UBA!) [Mongolia, Selenge Aimag, Shaamar Somon, 25 VII 1957, №1257, B. Mostchak, Sh. Darima]

5. C. microcarpa Andr.

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

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, pr. Kulscha, 8 V 1877, A. Regel (LE!) [China, Dzungaria, Iter Turkestanicum, pr. Kulscha, 8 V 1877, A. Regel] (2 specimen)

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Pilusch, bei Kulscha, 17 V 1877, A. Regel (LE!) [China, Dzungaria, Iter Turkestanicum, pr. Kulscha, 17 V 1877, A. Regel]

[Китайская Народная Республика, Джунгария] Iter Turkestanicum, Chojur-Sumin ad fl. illi, 27 V 1877, A. Regel (LE!) [China, Dzungaria, Iter Turkestanicum, Chojur-Sumin ad fl. illi, 27 V 1877, A. Regel]
References/Литература

Dorofeyev V.I. Camelina (Cruciferae, Brassicaceae): structure of genus and list of species. Vavilovia. 2019;2(2):3-24. [in Russian] (Дорофеев В.И. Рыжик – Camelina (Cruciferae, Brassicaceae): внутренняя структура и видовой список. Vavilovia. 2019;2(2):3-24. DOI: 10.30901/2658-3860-2019-2-22)

Dorofeyev V.I. Genus Camelina (Brassicaceae) of the Caucasian flora. Botanicheskii zhurnal = Botanical Journal. 1996;81(8):95-99. [in Russian] (Дорофеев В.И. Род Camelina (Brassicaceae) во флоре Кавказа. Ботанический журнал. 1996;81(8):95-99).

German D.A. Cruciferae (Brassicaceae): Alternative treatment for the “Conspectus of the vascular plants of Mongolia” (2014). Turczanianowia. 2015;18(2):39-67. DOI: 10.14258/turczanianowia.18.2.4

German D.A. New data on the species composition and distribution of Mongolian Cruciferae. Botanicheskii zhurnal = Botanical Journal. 2009;94(8):1149-1158. [in Russian] (Герман Д.А. Новые данные о видовом составе и распространении крестоцветных (Cruciferae) Монголии. Ботанический журнал. 2009;94(8):1149-1158).

Grubov V.I., Yunatov A.A. The main features of the flora of the Mongolian People’s Republic in connection with its zoning. Botanicheski zhurnal = Botanical Journal. 1952;37(1):45-64. [in Russian] (Грубов В.И., Юнатур А.А. Основные особенности флоры Монгольской Народной Республики в связи с ее районированием. Ботанический журнал. 1952;37(1):45-64).

Urgamal M., Oyuntsegtseg B., Nyambayar D., Dulamsuren Ch. Conspicuous of the vascular plants of Mongolia. Ulaanbaatar; 2014.

Žerdoner Čalasan A., Seregin A.P., Hurka H., Hofford N.P., Neuffer B. The Eurasian steppe belt in time and space: Phylogeny and historical biogeography of the false flax (Camelina Crantz, Camelineae, Brassicaceae). Flora. 2019;260:151477. DOI: 10.1016/j.flora.2019.151477

Zhou H., Lu L., Yang G., Al-Shehabz I.A. Camelina Crantz. In: Flora of China. Vol. 8. Beijing; St. Louis; 2001. p.189.