compared to the previous year. Thus, the data obtained from the rapeseed trials made it possible to identify, based on a set of economically valuable traits, the most suitable, high-yielding, and adaptable samples for breeding (selection of parental pairs for intraspecific crossings) under the conditions of Northern Kazakhstan. Among the examined varieties of the global rapeseed collection (37 samples), 9 samples were identified as the most adapted to sharp climate fluctuations: Maikudyk, St., RY105, Yarvelon, VNIIMK-21, OR005, Ole, Viking, 44C73, and K601. Therefore, this research has high practical significance for the development of new rapeseed varieties resistant to climate variability, which is especially important for ensuring stable yields and food security in Northern Kazakhstan.

Key words: spring rape, collection samples, drought, moisture, productivity elements, plasticity, yield.

IRSTI 34.33.19 **DOI** https://doi.org/10.37884/2-2025/15

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FIRST RECORD OF *XEROBION HORTOBAGYI* (SZELEGIEWICZ 1978) FROM KAZAKHSTAN WITH NOTES ON ITS BIONOMICS (HEMIPTERA: APHIDIDAE, APHIDINA)

Abstract

The systematics and taxonomy of xerophilous aphid genera within the subtribe *Aphidina*—*Protaphis* Börner, 1940; *Brachyunguis* B. Das, 1918; and *Xerobion* Nevsky, 1928—remain a subject of considerable relevance, particularly in the context of Central Asia. Species of these genera are widely distributed in Kazakhstan, inhabiting clay, sandy, rocky, and saline deserts, as well as steppe and forest-steppe zones. The genus *Xerobion* is native to arid regions of the southern Palearctic and currently comprises 21 recognized species globally. Of these, 15 have been recorded in Kazakhstan. All known species are either narrow oligophages or monophages, typically found on plants of the families Chenopodiaceae and Asteraceae, where they live openly on above-ground parts.

In 2022, multiple specimens of *Xerobion hortobagyi* (Szelegiewicz, 1978) were collected for the first time in Kazakhstan, on *Seriphidium sublessingianum* in the Syntas area of the northern slope of the Tarbagatai Range. Previously, this species was known only from the steppe regions of Slovakia and Hungary. A morphological description of *X. hortobagyi* is provided, along with notes on its bionomics, potential distribution, and newly compiled distribution maps.

Key words: *aphids, Xerobion, X. hortobagyi, first record, Aphididae, Aphidina, Tarbagatai Range, Kazakhstan.*

Introduction

The systematics and taxonomy of xerophilous aphid genera within the subtribe Aphidina—including *Protaphis* Börner, 1940, *Brachyunguis* B. Das, 1918, and *Xerobion Nevsky*, 1928—remain highly relevant, particularly for arid ecosystems. Species of these genera are especially abundant in Kazakhstan, where they inhabit a range of habitats such as clay, sandy, rocky, and saltwort deserts, as well as steppe and forest-steppe zones. Many xerophilous aphids are considered pests of pasture plants in these regions, and understanding their relative abundance, host specificity, and biology is of significant ecological and economic importance [1].

Of particular interest is the first record of a previously unreported species of *Xerobion* in eastern Kazakhstan. In 2022, multiple specimens of *Xerobion hortobagyi* (Szelegiewicz, 1978) [2] were collected on *Seriphidium sublessingianum* in the Syntas area on the northern macroslope of the Tarbagatai Range. This aphid species was previously known only from the steppe zones of Slovakia [3] and Hungary [2]. The Kazakh population appears morphologically consistent with the Hungarian specimens, suggesting stable diagnostic characters.

The genus *Xerobion*, originally described by Nevsky in 1928, is distributed across arid zones of the southern Palearctic. To date, 21 species of this genus have been described globally [4, 5], with 15 of them recorded in Kazakhstan [6]. The most recent taxonomic revision of the genus was published recently [7]. All known species of Xerobion are highly host-specific, either narrow oligophages or strict monophages, typically feeding on members of the families Amaranthaceae and Asteraceae, and living openly on the above-ground parts of their host plants.

All measurements and images presented in this study were obtained using a Bel Photonics compound microscope.

Materials and Methods

Specimens were mounted on permanent slides using coniferous balsam as the mounting medium [7]. Observations and measurements were made under a Bel Photonics light microscope. Identification was carried out by comparison with verified material housed at the Institute of Zoology, Ministry of Education and Science of Kazakhstan (Almaty). All morphometric values are reported in millimeters. The most recent taxonomic revision of the genus *Xerobion* was also consulted [7]. Plant nomenclature was confirmed according to Plants of the World Online (POWO) [8]. The original description of *Xerobion hortobagyi* (Szelegiewicz, 1978) was reviewed for diagnostic comparison.

Results and discussion

Xerobion hortobagyi (Szelegiewicz, 1978)

Material examined: Kazakhstan, East Kazakhstan, Abai Region, Tarbagatai Natural Park. Syntas ravine, north-facing macroslope of the Tarbagatai Ridge (N 47°24.781’, E 081°54'001"), 1315 m elevation, 14 July 2021, collected by R. Kadyrbekov. A total of 15 apterous viviparous females were collected on *Seriphidium sublessingianum*.

Distribution: Previously recorded in Slovakia [6, 9] and Hungary (Hortobágy, Nagyhegyes). The present study documents the first occurrence of this species in Kazakhstan (East Kazakhstan, Tarbagatai Ridge) (Fig. 1).

Figure 1. Known distribution of *Xerobion hortobagyi* (Szelegiewicz, 1978)

Description (apterous viviparous female): Body shape broadly oval, size 1.04–1.16 mm (fig. 2). Cuticle reticulated. Front straight. Frontal setae (0.016–0.021mm) equal to or slightly longer than the basal diameter of antennal segment III (1.00–1.25×). Antennae five- or six-segmented, measuring 0.45–0.48× body length. Segmental setae counts: I (2–3), II (2–3), III (3–5), IV (1–3), V (1–3), VI (4–6).

Figure 2. Habitus of *Xerobion hortobagyi* (Szelegiewicz 1978)

Third antennal segment 0.08–0.12 times of body length, 1.25–1.57 times longer than fourth, 2.0–3.0 times longer than processus terminalis, 0.71–0.92 times of sixth segment, or 1.14–1.20 times of fifth segment with five-segment antennae, also 2.75–3.66 times exceeds length of siphunculi, with 1–2 secondary rhinaria. Fourth antennal segment 0.64–0.80 times of length of III segment, with 1 secondary rhinaria. Fifth antennal segment 0.66–1.00 times of length of the base of 6th antennal segment without secondary rhinaria. Last antennal segment 1.08–1.40 times of length of third antennal segment. Processus terminalis 0.46–0.56 times of base of the last antennal segment, 0.33–0.50 times of third of 6th antennal segment and 0.15–0.19 times of width of head between the eyes. Fourth antennal segment 1.00–1.16 times of length of fifth segment. Setae of third antennal segment (0.006–0.009) are 0.30–0.45 times of its diameter at the base. Clypeus normal, not enlarged, rostrum reaches hind coxae. Ultimate rostral segment is stiletto-shaped, 1.1–1.2 times longer than the second hind tarsus, 2.0–2.8 times of its own width at base, 1.00–1.43 times of length of base of last antennal segment, 0.34–0.41 times of width of head between eyes, 2.5–3.3 times as long as siphunculi, with 2 additional setae. Siphunculi are short, volcano-shaped, with clear flanges, 0.025–0.038 times of body length, 0.14–0.16 times of head width between the eyes, 0.33–0.50 times of base of last antennal segment, 0.3–0.5 times of cauda, 0.75–0.89 times of their maximum width, 0.33–0.50 times of length of 2nd segment of hind tarsus. Cauda shortly triangular; 0.66–0.83 times of its own width at base, 0.076–0.093 times of body length, 0.87—1.00 times of length of second hind tarsus, with 23–29 setae. Marginal tubercles, almost flat, present on prothorax and I–VII abdominal tergites (fig. 3). Diameter of the marginal tubercle on I and VII tergites of abdomen (0.028–0.036), on II–VI (0.012–0.020) distinctly smaller, tubercle hemispherical to conic, 1.2–1.4 times of diameter of third antennal segment at base. Setae on II–VI abdominal tergites (0.014–0.017) 0.7–0.9 times of diameter of III antennal segment at base. Abdominal tergite VIII with 5–6 setae (0.02–0.04) 1.5–2.0 times of diameter of third antennal segment at base. Subgenital plate oval, with two setae on disk and 4–6

setae on posterior margin. Legs normally developed. Posterior femur 0.16–0.20 times of body length and 0.68–0.76 times of the width of head between the eyes. The hind tibia 0.30–0.38 times of body length, 1.20–1.39 times of width of head between the eyes. Second hind tarsus 0.75–1.00 of base length of last antennal segment. Lower setae of hind trochanter (0.03–0.04) 0.3–0.5 times of diameter of trochanter-femur suture, longest setae on outer side of posterior femur (0.02) is times 0.35–0.40 of diameter of trochanter-femur suture. First segment of tarsi with 3: 3: 2 setae.

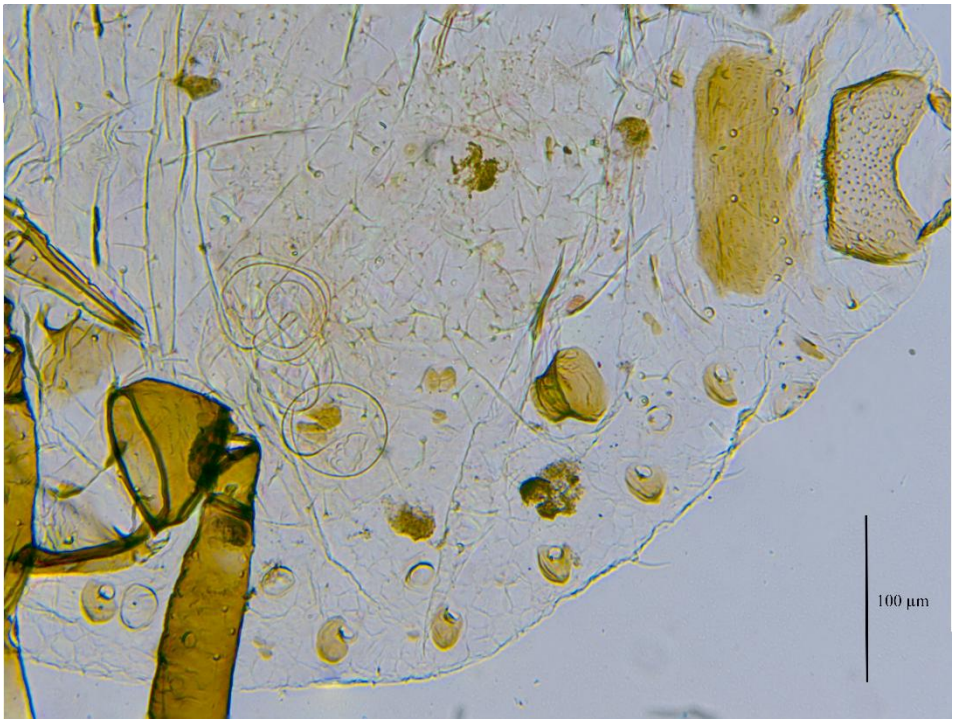

Figure 3. Marginal tubercles of *Xerobion hortobagyi* (Szelegiewicz 1978)

Natural color. Body dark green with a weak gray bloom, head, upper half of III, IV–VI antennal segments, clypeus, coxae, trochanter, femur except the base, base and top of the legs, tarsi, subgenital plate light brown, siphunculi black, the cauda green.

Color on slide. Head, I, II, upper half of III, IV–VI antennal segments, clypeus, coxae, trochanters, femora except the base, base and tops of the tibiae, tarsi, subgenital plate light brown or brown; cauda light.

Biology. Aphids live on stems and inflorescences of *Seriphidium maritimum* (L.) Poljak, *S. sublessingianum* (Krasch. et Poljak.) Poljak (Asteraceae). Visited by ants.

At the places where *Seriphidium sublessingianum* grows on the northern macroslope of Tarbagatai Range grass-sagebrush communities are observed with the following grass and forbes species present: *Stipa capillata*, *Festuca sulcata*, *Artemisia marschalliana*, *Galatella punctata*, *Altaea nudiflora* and *Galium aparine*. *Limonium gmelini*, *Sedobassia sedoides*, *Camphorosma lessingii* occur in the areas with slightly salinized soils. Some shrub species (*Caragana pumila*, *Krascheninnikovia ceratoides*, *Spiraea hypericifolia*) occur sporadically (fig. 4).

Seriphidium sublessingianum, host plant of *Xerobion hortobagyi* in Kazakhstan, occur there in steppe lopes of Kazakh Plateau as well as in steppe and semidesert mountain belts from Tarbagatai to western Tien-Shan [10].

Genus *Seriphidium* (Besser et Less.) Fourss distributed in the arid zone of the Palearctic, from North Africa, Southern and locally Central Europe to steppes and deserts of Mongolia and Western China with the highest species diversity observed in Central Asia [11].

Figure 4. Habitat where *Seriphidium sublessingianum* grows on the northern macroslope of Tarbagatai Range (Syntas)

Conclusion

Xerobion hortobagyi, previously recorded on *Seriphidium maritimum* in Europe and on *Seriphidium sublessingianum* in Kazakhstan, appears to have a distribution restricted to dry steppe and slightly salinized steppe habitats in Eastern Europe and the northern half of Kazakhstan. Notably, extensive aphid surveys conducted in Kazakh desert regions on *Seriphidium* species did not yield *X. hortobagyi*, but instead recovered other members of the genus, such as *Xerobion alakuli* (Juchnevitsch, 1974) and *X. cinae* (Nevsky, 1928).

This pattern suggests that *X. hortobagyi* is a steppe-adapted species that does not extend into true desert environments. Moderately to extremely dry steppe zones in Kazakhstan are typically located between 47º and 50º N latitude [12]. Based on this ecological preference, regions at similar latitudes in the Czech Republic, Poland, Romania, Moldova, Ukraine, the Lower Volga region of Russia, and Kazakhstan should be considered as potential areas for future records of *Xerobion hortobagyi* (Fig. 5).

Figure 5. Potential distribution areas of *Xerobion hortobagyi* (Szelegiewicz 1978) in the southern Palearctic

Thus, aphid fauna of Kazakhstan was replenished with a new xerobiont species, characteristic of the steppe ecosystems of Eurasia.

Acknowledgments. Authors thank S.V. Kolov to our colleague for fotos of Xerobion hortobagyi and the completed information cards in the text. This research has been is program No. BR21882199, “Inventory of wild animals of arid territories of the Balkhash-Alakol basin with an assessment of threats to their conservation and sustainable use” funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan.

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XEROBION HORTOBAGYI (SZELEGIEWICZ 1978) ТҮРІНІҢ ҚАЗАҚСТАНДА АЛҒАШ ТІРКЕЛУІ ЖӘНЕ БИОНОМИЯСЫ БОЙЫНША ЕСКЕРТПЕЛЕРІМЕН (HEMIPTERA: APHIDOMORPHA)

Аңдатпа

Aphidina тұқымдастығына жататын ксеробионтты бітелер туыстары — *Protaphis* Börner, 1940, *Brachyunguis* B. Das, 1918, *Xerobion* Nevsky, 1928 — жүйелілігі мен таксономиясы бойынша мәселелер әлі де өзекті болып отыр. Бұл туыстардың өкілдері Қазақстан аумағында кең таралған, олар сазды, құмды, тасты және тұзды шөлдерде, сондай-ақ дала және орманды дала аймақтарында кездеседі. *Xerobion* Nevsky, 1928 туысы Оңтүстік Палеарктиканың құрғақ аймақтарына тән. Қазіргі уақытта бұл туысқа әлемдік фаунада белгілі 21 түр кіреді. Қазақстанда осы туысқа жататын 15 түр анықталған. Барлық белгілі түрлер — Chenopodiaceae және Asteraceae тұқымдастарына жататын өсімдіктердің жер бетіндегі бөліктерінде тіршілік ететін тар маманданған олигофагтар немесе монофагтар.

2022 жылы Тарбағатай жотасының солтүстік макробөктерінде (Сынтас шатқалы) *Seriphidium sublessingianum* өсімдігінде *Xerobion hortobagyi* (Szelegiewicz, 1978) түрінің бірнеше дарасы алғаш рет жиналды. Бұған дейін бұл түр тек Венгрия мен Словакия далаларынан белгілі болған. Бұл жұмыста аталған түрдің морфологиялық сипаттамалары келтіріліп, оның ықтимал таралу аймақтары талқыланды. Сонымен қатар ақпараттық таралу картасы жасалды.

Кілт сөздер: бітелер, *Xerobion*, *X. hortobagyi*, алғаш анықталуы, Aphididae, Aphidina, Тарбағатай жотасы, Қазақстан.

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ПЕРВАЯ НАХОДКА *XEROBION HORTOBAGYI* (SZELEGIEWICZ 1978) В КАЗАХСТАНЕ С ПРИМЕЧАНИЯМИ ПО ЕГО БИОНОМИКЕ (HEMIPTERA: APHIDOMORPHA)

Аннотация

Проблема систематики и таксономии ксеробионтных родов тлей подтрибы *Aphidina* — *Protaphis* Börner, 1940, *Brachyunguis* B. Das, 1918 и *Xerobion* Nevsky, 1928 — остаётся актуальной. Представители этих родов особенно многочисленны в Казахстане, где они обитают в глинистых, песчаных, каменистых и солончаковых пустынях, а также в степной и лесостепной зонах. Род *Xerobion* Nevsky, 1928 распространён в аридных регионах Южной Палеарктики и включает в настоящее время 21 вид, известный мировой фауне. В Казахстане зарегистрировано 15 видов данного рода. Все известные виды являются узкоспециализированными олигофагами или монофагами, живущими на наземных частях растений семейств *Chenopodiaceae* и *Asteraceae*.

В 2022 году на северном макросклоне хребта Тарбагатай (Сынтас) впервые для Казахстана были собраны многочисленные экземпляры *Xerobion hortobagyi* (Szelegiewicz, 1978) на растении *Seriphidium sublessingianum*. Ранее данный вид был известен только из степей Венгрии и Словакии. В работе приводится морфологическое описание вида, обсуждаются особенности его биономики и потенциальные ареалы распространения. Составлены информационные карты.

Ключевые слова*:* тли, *Xerobion*, *X. hortobagyi*, новая находка, *Aphididae*, *Aphidina*, хребет Тарбагатай, Казахстан.