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TRITICINAE ТАРМАҒЫНЫҢ КЕЙБІР ӨКІЛДЕРІ: ТАКСОНОМИЯ ЖӘНЕ НОМЕНКЛАТУРА

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Андатпа. Биоалуантүрлілікті сақтау және табиғи экожүйелердің тұрақтылығын қамтамасыз ету қазіргі ғылымның маңызды мәселелерінің бірі болып табылады, әсіресе өсімдіктер алуан түрлілігінің азаюы жағдайында. *Elymus* L. (Poaceae) туысы – шаруашылық тұрғыдан маңызды әрі таксономиялық жағынан күрделі топ, ол Орталық Азияда, соның ішінде Өзбекстанда жеткілікті зерттелмеген. Зерттеудің мақсаты – Өзбекстан флорасындағы *Elymus* түрлеріне кешенді таксономиялық және биогеографиялық талдау жүргізу, олардың жүйелік мәртебесін нақтылау және таралу заңдылықтарын анықтау. Зерттеу Өзбекстан Ұлттық гербарийіндегі (TASH) материалдарды қайта қарау, ғылыми әдебиеттерді талдау және халықаралық дерекқорлармен салыстыру негізінде жүргізілді. Таксономиялық мәселелерді шешу үшін морфологиялық талдау мен номенклатуралық тексеру әдістері қолданылды. Нәтижесінде Өзбекстан флорасында екі секцияға (*Anthosachne* және *Goulardia*) жататын 11 түр анықталды, ал кейбір таксондар дәлелдердің жеткіліксіздігіне байланысты алынып тасталды. Бірқатар түрлердің таксономиялық мәртебесі нақтыланып, синонимия қайта қаралды. Туыс ішіндегі түрлерді ажыратудың күрделілігі көрсетілді. Зерттеу нәтижелері аймақ флорасының құрамын нақтылауға үлес қосып, болашақ ботаникалық зерттеулерге ғылыми негіз қалайды. Практикалық тұрғыдан бұл мәліметтер биоалуантүрлілікті қорғау, экологиялық мониторинг және өсімдік ресурстарын тиімді пайдалану үшін маңызды.

Негізгі сөздер: Poaceae, *Triticinae*, *Elymus*, Өзбекстан флорасы, таксономия.

НЕКОТОРЫЕ ПРЕДСТАВИТЕЛИ ПОДТРИБЫ TRITICINAE: ТАКСОНОМИЯ И НОМЕНКЛАТУРА

Аннотация. Сохранение биоразнообразия и устойчивости природных экосистем является одной из актуальных задач современной науки, особенно в условиях сокращения разнообразия растений. Род *Elymus* L. (Poaceae) представляет собой сложную в таксономическом отношении и хозяйственно значимую группу, недостаточно изученную в Центральной Азии, включая Узбекистан. Целью данного исследования является проведение комплексного таксономического и биогеографического анализа видов рода *Elymus* во флоре Узбекистана, уточнение их систематического положения и изучение закономерностей распространения. Исследование основано на ревизии гербарных образцов Национального гербария Узбекистана (TASH), анализе литературных источников и сопоставлении с международными базами данных. Применялись морфологический анализ и номенклатурная проверка для решения таксономических проблем. В результате установлено наличие 11 видов, относящихся к двум секциям (*Anthosachne* и *Goulardia*), тогда как ряд таксонов исключён из флоры ввиду отсутствия достоверных данных. Предложены уточнения таксономического статуса отдельных видов и пересмотрены синонимы. Подтверждена сложность разграничения видов внутри рода. Полученные результаты вносят вклад в уточнение флористического состава региона и формируют научную основу для дальнейших исследований. Практическое значение заключается в возможности использования данных для охраны биоразнообразия, экологического мониторинга и рационального использования растительных ресурсов.

Ключевые слова: Poaceae, *Triticinae*, *Elymus*, флора Узбекистана, таксономия.

CERTAIN REPRESENTATIVES OF THE SUBTRIBE TRITICINAE: TAXONOMY AND NOMENCLATURE

Abstract. The conservation of biodiversity and the stability of natural ecosystems are among the most pressing challenges of modern science, particularly in the context of declining plant diversity. The genus *Elymus* L. (Poaceae) represents a taxonomically complex and economically important group that remains insufficiently studied in Central Asia, including Uzbekistan. This study aims to conduct a comprehensive taxonomic and biogeographical analysis of *Elymus* species in the flora of Uzbekistan, clarify their systematic status, and assess their distribution patterns. The research is based on the critical revision of herbarium specimens preserved in the National Herbarium of Uzbekistan (TASH), supplemented by modern taxonomic concepts, literature review, and comparative analysis with international databases. Morphological evaluation and nomenclatural verification were applied to resolve taxonomic ambiguities. As a result, 11 species belonging to two sections (*Anthosachne* and *Goulardia*) were confirmed for the flora of Uzbekistan, while several taxa were excluded due to lack of reliable evidence. Significant taxonomic clarifications were proposed, including recognition of certain taxa at species rank and revision of synonymy. The study highlights ongoing debates in

species delimitation within the genus. The findings contribute to the refinement of regional floristic composition and provide a reliable taxonomic framework for further botanical research. Practically, the results can be used in biodiversity conservation, ecological monitoring, and sustainable utilization of plant resources in Uzbekistan.

Keywords: Poaceae, *Triticinae*, *Elymus*, Flora of Uzbekistan, taxonomy.

Introduction. The issue of conserving biodiversity and ensuring the stability of natural ecosystems is becoming increasingly important worldwide. Changes in the environment caused by various ecological factors are leading to a significant decline in biological diversity, particularly in the diversity of plant resources. In this regard, identifying plant diversity in natural landscapes, studying their systematic status and distribution patterns, and developing scientifically grounded measures for their conservation are of great scientific and practical importance.

One of the priority tasks of modern science studying plant diversity is to investigate genera and groups that have economic potential but remain insufficiently studied from taxonomic and biogeographical perspectives. Among such objects are representatives of the genus *Elymus* L. (Poaceae Barnhart). Their systematic analysis is of great scientific and practical significance. These studies are relevant not only for clarifying their taxonomic status but also for assessing their role in biodiversity.

At the global level, *Elymus* is one of the large polymorphic genera of the family Poaceae, comprising about 175 species [1]. The genus was first described by Carl Linnaeus in 1753 [2]. Various aspects of *Elymus* species have been studied by foreign researchers, including taxonomy and molecular phylogeny [3], leaf micromorphology [4], pollen morphology [5], drought tolerance [6], hybridization [7], meiotic configuration and chromosome number [8], seed longevity [9], and others.

The main taxonomic results on the genus *Elymus* and the Poaceae family in Central Asia are reflected in the works of Nevski (1934), Drobov (1941), Nikiforova (1968), Tzvelev (1976), and others [10, 11, 12, 13]. The first taxonomic and biogeographical analysis of the genus *Elymus* in the flora of Uzbekistan was carried out by Drobov [11].

The typification of species within the genus is still being studied. For example, although *Elymus caninus* was introduced to science in 1755, its typification was only examined in 2019 by Santiago Andrés-Sánchez et al. [14, 15]. The type specimen of *E. tschimganicus* is preserved in the National Herbarium of Uzbekistan (TASH), although the information provided by V. Drobov (1925) contains certain shortcomings [16]. Such cases indicate the need for targeted research on *Elymus* species distributed in the flora of Uzbekistan.

Despite more than two centuries of research on *Elymus* taxonomy, debates regarding species delimitation have not yet been fully resolved. However, new-generation studies focused on taxonomy and biogeography are introducing significant changes to the composition of regional floras.

In subsequent years, various floristic and geobotanical studies, as well as research conducted within the framework of the state cadastre of Uzbekistan's administrative regions, have provided important information on the diversity and current geographical distribution of certain *Elymus* species. Within the framework of projects on the cadastre of higher plants across the regions of the republic, several regional cadastral have been published in recent years by researchers of the Institute of Botany. According to these sources, 11 (7) species have been reported in Tashkent region, 7 in Jizzakh (including *E. nevskii* [= *E. dentatus*], *E. tianschanigenus* [= *E. uralensis*]), 7 in Kashkadarya (including *E. transhyrcanus*), 6 in Surkhandarya, 4 in Samarkand, 3 in Navoi, and 1 species in Bukhara region. However, according to the current taxonomic system, most of the species listed in these works are now recognized under other genera such as *Campeiostachys* Drobov, *Elytrigia*, *Leymus* Hochst., *Psathyrostachys* Nevski ex Roshev., *Pseudoroegneria* (Nevski) Á. Löve, and *Thinopyrum* Á. Löve [17, 18, 19, 20].

K.Sh. Tojibaev et al. (2016) carried out a botanical-geographical regionalization of Uzbekistan, dividing the country into two provinces (Mountainous Central Asia and Turan), 16 districts, and 38 botanical-geographical regions [21]. In particular, K. Tojibaev (2010) reported 6 species and 3

subspecies of the genus in the flora of the Southwestern Tien Shan; A. Ibragimov (2010) recorded *E. longearistatus* in the flora of the Surkhan State Reserve; Khasanov et al. (2013) identified *E. lachnophyllus*, *E. transhyrcanus*, and the hybrid *Elymus* × *macrolepis* (Drobow) Tzvelev in the flora of the Zaamin State Reserve; U. Kodirov (2020) reported 4 species in the Urgut botanical-geographical region; and T. Aromov recorded 7 species of *Elymus* in the flora of the Hissar State Reserve [22, 23, 24].

At the same time, the floras of some regions remain insufficiently studied, and their species lists have not yet been fully compiled. Currently, floristic research is being actively carried out by a number of researchers. However, since herbarium specimens of the genus were not purposefully collected within these studies, the opportunities for in-depth investigation of species diversity, ecological characteristics, and distribution ranges of *Elymus* in Uzbekistan remain limited.

Materials and Methods. Herbaria represent the most important source of information for taxonomic studies of plants [25]. The process of making taxonomic decisions for complex plant groups can be accelerated through modern tools and resources, such as digital collections and DNA analysis based on herbarium materials [25]. The study is based on herbarium materials preserved in the National Herbarium of Uzbekistan (TASH), the largest botanical collection in Central Asia, containing more than 38,000 specimens of the family Poaceae.

The research material consisted of herbarium specimens of the genus *Elymus* collected from different regions of Uzbekistan. Both historical and recent collections were analyzed, providing qualitative and quantitative data on species diversity and distribution.

The study included the following research questions:

- What is the actual species composition of *Elymus* in Uzbekistan?
- How do regional data correspond to modern taxonomic concepts?
- Which taxa require revision or exclusion?

The hypothesis was tested through a multi-stage research process:

Stage 1: Collection and selection of herbarium specimens;

Stage 2: Morphological examination and identification;

Stage 3: Comparative analysis with literature and databases (POWO, GBIF);

Stage 4: Nomenclatural verification and typification analysis;

Stage 5: Biogeographical assessment.

The methods used include:

- classical morphological analysis;
- comparative taxonomic method;
- nomenclatural analysis;
- herbarium revision;
- biogeographical mapping.

Modern approaches such as digitized herbarium data and literature integration were also applied. Standard taxonomic procedures were followed without duplication of previously established methodologies.

The results obtained include clarified species composition, updated taxonomy, and revised distribution data.

Results and Discussion.

In Central Asia, including studies on the genus *Elymus*, intensive research has led to significant results. In the global flora, 1,188 taxa of the genus have been recorded, consisting of amphiploid, self-pollinating perennial grasses, more than half of whose populations grow in Central Asia, and which are widely distributed across all continents from the Holarctic to the subtropics. According to POWO (Plants of the World Online), the genus comprises 175 species worldwide, of which 12 species are distributed in the flora of Uzbekistan [1]. However, in the monograph “Grasses of the USSR” published by N.N. Tzvelev (1976), detailed information on grasses of the former USSR flora is provided, and a systematic list of species within the genus was established. According to this source, 36 species belonging to 5 sections occur in the region [13].

In the work “Grasses of Russia” published in 2019 by N.N. Tzvelev and his student N.S. Probatova, several changes to the taxonomy of the genus were introduced [26]. In particular, despite the POWO data, the species *E. lolioides* (P. Candargy) Melderis and *E. repens* (L.) Gould are treated as representatives of the genus *Elytrigia* Desv., section *Elytrigia*, under the names *Elytrigia lolioides* (Kar. et Kir.) Nevski and *Elytrigia repens* (L.) Nevski [26]. This classification is based on morphological features such as the presence of transverse grooves at the base of the glumes, partially rolled upper halves of glumes, smooth or slightly rough midribs, weakly developed spike rachis internodes, blunt callus of the lower lemma, and growth forms characterized by tufted or long creeping rhizomes.

Additionally, the species *E. tschimganicus* (Drobow) Tzvelev, described by Tzvelev (1976) and distributed in the Tien Shan of Central Asia, with a lectotype collected near Tashkent by Popov in 1921, was included in the flora list [13]. Furthermore, *E. uralensis* (Nevski) Tzvelev is listed in international databases as part of the flora of Uzbekistan; however, according to Tzvelev and Probatova (2019), this species is considered endemic to the Southern Ural region, where it was first discovered [26].

Moreover, Tzvelev (1976) reported subspecies within the genus, including *E. uralensis* subsp. *tianschanicus*, first recorded from the Western Tien Shan (Khumsan, Naudale Mountains) [13]. Later, S.K. Cherepanov (1995), in “Vascular plants of Russia and adjacent states (the former USSR)”, treated this taxon as a separate species, *E. tianschanigenus* Czerep. Based on these data, *E. tianschanigenus* rather than *E. uralensis* was included in the flora of Uzbekistan [27].

Further taxonomic changes concern subspecies of *E. dentatus*. According to POWO, *E. dentatus* (Hook.f.) Tzvelev is part of the flora of Uzbekistan. Tzvelev (1976) recognized subspecies such as *E. dentatus* subsp. *ugamicus* and subsp. *lachnophyllus*. However, Cherepanov (2015) elevated *E. dentatus* subsp. *lachnophyllus* to species rank as *E. lachnophyllus* [27]. Subsequently, Tzvelev and Probatova (2019) treated *E. dentatus* subsp. *ugamicus* as *E. nevskii* Tzvelev, with a lectotype collected from the Ugam Range (Tashkent region) in 1921 by Uranov [27].

Although international databases such as POWO and GBIF treat *E. nevskii* and *E. lachnophyllus* as heterotypic synonyms of *E. dentatus*, based on literature data and herbarium specimen analysis, these taxa are recognized as independent species in the flora of Uzbekistan [1, 28].

Conversely, based on comparisons of specimens from major herbarium collections (MW, US, W), the National Herbarium of Uzbekistan (TASH), and Samarkand State University (SAMSU), along with POWO data, the species *E. abolinii* (Drobow) Tzvelev and *E. gmelinii* (Trin.) Tzvelev were excluded from the flora of Uzbekistan due to lack of confirmed herbarium evidence [13].

In conclusion, 11 species belonging to two sections (*Anthosachne*, *Goulardia*) of the genus are included in the forthcoming edition of the flora of Uzbekistan:

- a) *E. sect. Anthosachne* (Steud.) Tzvelev:
 1. *E. longe-aristatus* (Boiss.) Tzvelev;
 2. *E. praeruptus* Tzvelev;
 3. *E. tschimganicus* (Drobow) Tzvelev;
 4. *E. uzbekistanicus* Usupbaev & Alieva sp. nov.
- b) *E. sect. Goulardia* (Husn.) Tzvelev:
 5. *E. caninus* (L.) L.;
 6. *E. fedtschenkoi* Tzvelev;
 7. *E. lachnophyllus* (Ovcz. et Sidorenko) Tzvelev;
 8. *E. macrochaetus* (Nevski) Tzvelev;
 9. *E. nevskii* Tzvelev;
 10. *E. tianschanigenus* Czerep.;
 11. *E. transhyrcanus* (Nevski) Tzvelev

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