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Өсімдіктердің биологиясы және биотехнологиясы институтының

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## ИЗВЕСТИЯ

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## NEWS

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OF THE REPUBLIC OF KAZAKHSTAN  
of the Institute of Plant Biology and Biotechnology

**БИОЛОГИЯ ЖӘНЕ МЕДИЦИНА  
СЕРИЯСЫ**



**СЕРИЯ**

**БИОЛОГИЧЕСКАЯ И МЕДИЦИНСКАЯ**



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## CENOFLORA OF *ADONIS WOLGENSIS* STEVEN IN NORTHERN KAZAKHSTAN

**Abstract.** The article presents the research results of the *Adonis Wolgensis* Steven cenoflora in Northern Kazakhstan. The materials were gathered in the process of field studies, the literary data was taken into account. The list of *Adonis Wolgensis* flora in Northern Kazakhstan is given on the basis of detailed-route studies. Cenoflora analysis of systematic structure, life forms composition, ecological groups, life expectancy of the individuals and ecological cenotic groups revealed the features of the *Adonis Wolgensis* populations' current state and position in the vegetation cover. According to systematic structure and composition of the ecological groups, this cenoflora does not differ significantly from the flora of Northern and Central Kazakhstan. It reflects particularity of the steppe zone's shrub thickets in Northern Kazakhstan. Spectrum of life forms and composition of ecological cenotic groups reflects the influence of zonal steppe communities. The peculiarity of modern ecological niche for *Adonis Wolgensis* is characterized by a group of meadow plants found in the communities of shrub thickets of Northern Kazakhstan. Currently, the cenopopulation of *Adonis Wolgensis* retains its ability for self-sustain and regeneration within the occupied ecological niche with a small anthropogenic load.

**Key words:** *Adonis Wolgensis* Steven, cenopopulation, Northern Kazakhstan, systematic structure, ecological cenotic groups.

**Introduction.** *Adonis Wolgensis* Steven is a steppe Pontic-Pannonian Zavolzhsy Kazakh type, widespread in the southern and the southeastern regions of the European part of Russia, in the central and the southern regions of Ukraine, in Central and Northern Kazakhstan, in the south of Western Siberia. The species was listed into the Red Book of Kazakhstan in 2014, as well as into the Red Book of the Saratov Region in 2006 [1, 2]. Literary data describes status of some *Adonis Wolgensis* populations in the Saratov region indicating the main phytocenoses in which they grow [3]. In Kazakhstan this kind of work has not been carried out before. Rare and endangered species need cenotic environment, which can show threats to their existence. Although floristic studies in Northern Kazakhstan have a long history, no studies have been carried out to study the cenoflor of rare species. Therefore, the aim of the research is to study the cenoflora of *Adonis Wolgensis* in Northern Kazakhstan.

**Material and research methods.** The studies were carried out during the flowering period of *Adonis Wolgensis* (26.04 – 15.05. 2018) in Pavlodar, Akmola and Kostanay regions: the eastern border - Ekibastuz district; the western border - Kostanay district (figure 1). For floristic description were selected the places with a high density of flowering *Adonis Wolgensis*. The studies were carried out by a detailed-route

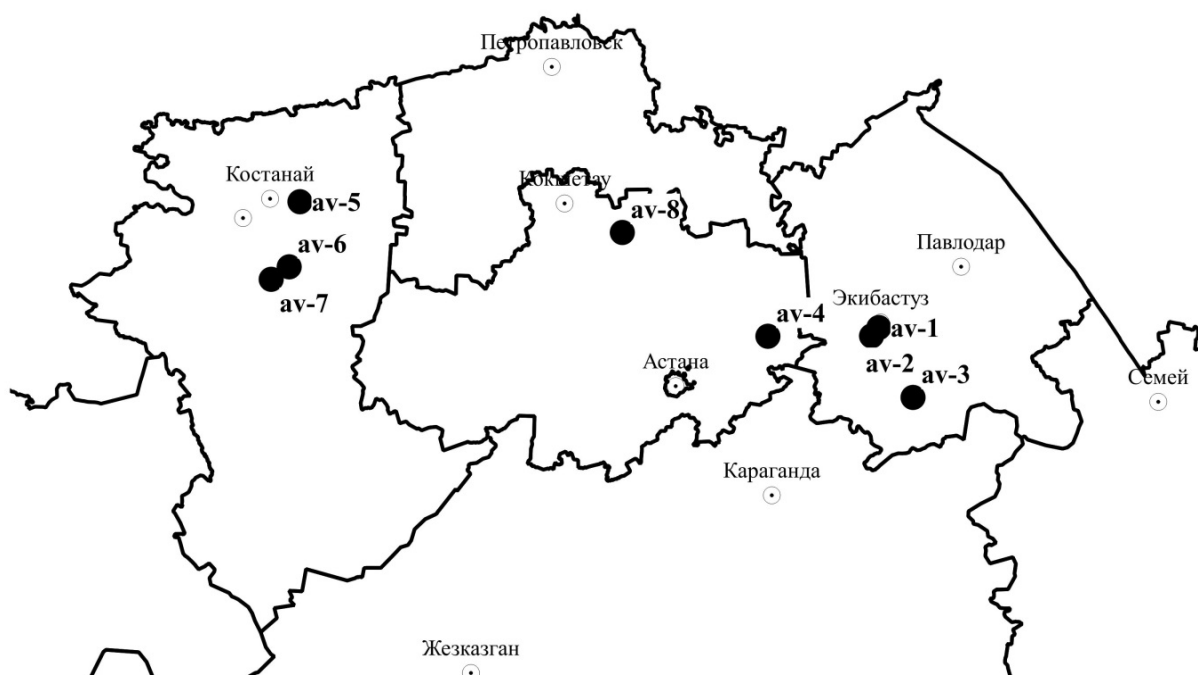


Figure 1 – Placement of studied *Adonis Wolgensis* Steven populations in Northern Kazakhstan

method, there have been examined and described 8 loci of *Adonis Wolgensis* populations and the communities with its participation. Basing on the collected data, there has been compiled a list of species, the analysis of which is present in this article.

The volume of families is given according to the summary of S.K. Cherepanov (1995), including modern data [4]. The families of flowering plants are arranged by the system of A.L. Takhtadzhyan [5]. The species in genera and the genera in families are arranged alphabetically.

**Results and discussion.** Populations of *Adonis Wolgensis* can be found almost on the entire territory of Northern Kazakhstan, which is more common in comparison with the existing data from the Flora of Kazakhstan [6]. The species was found for the first time in Kokshetau floral district.

It should be noted that in the south of Russia the spectrum occupied by *Adonis Wolgensis* steppe community is quite wide - from the most mesophytic variants of communities with a dominance of *Poa angustifolia* L. on the slopes and bottoms of shallow gulches and ecotones on the border with forest phytocenoses to the white wormwood-fescue phytocenoses on solonchous chestnut soils [3].

In Northern Kazakhstan, *Adonis Wolgensis* also grows in various types of communities. Its populations occupy areas of 200-600 square meters. The location of plants is curt: each curtain is made up of several individuals of different age. In spring adonis forms an aspect and its projective coverage can reach up to 3%.

In the environs of Ekibastuz populations of *Adonis Wolgensis* (CP 1,2) are located along the slopes and inter-sugarloaf downhill in shrub thickets on slightly and moderate saline clay soils. In the Bayanaul Mountains (CP 3) this species grows in dells and at the foot of slopes on dark chestnut soils in thickets of steppe shrubs. In the Erejmentau Mountains (CP 4), the population under study is in the solonchous meadow formed at the foot of a hill. In Kostanay region the populations are found along the fringes of pine forests on sandy soil (CP 5) and also on the site of an old burnt forest (CP 6) with a formed cereal-bean community (*Amygdalus nana*). Another population grows on the territory of "Stone Lake" in the shrubs thickets (CP 7). On the Kokshetau Upland (CP 8) *Adonis Wolgensis* populations are located along the edges of birch and pine forests on not-completely developed chestnut soils. The data on the location of the investigated cenopopulations is presented in table 1.

The cenoflora of *Adonis Wolgensis* includes 119 species belonging to 28 families and 75 genera (table 2). The most rich in species composition families are *Asteraceae*, *Rosaceae* and *Poaceae*. Only four families (*Asteraceae*, *Rosaceae*, *Poaceae*, *Fabaceae*) have more than three genera, the remaining have 1-3 genera.

Table 1 – Characteristics of cenopopulations (CP) of *Adonis Wolgensis* Steven

Number of CP	Location of CP	Habitat	Density of species, species/100m <sup>2</sup>	GPS, %
CP 1	Pavlodar region, Ekibastuz district, N51.66494°, W75.28173°, h=412 m above sea level	Inter-sugarloaf downhill, feather grass-fescue steppe.	24	60
CP 2	Pavlodar region, Ekibastuz district, natural boundary "Three birches", N51.57517°, W75.13187°, h=403 m above sea level	Eastern slope of sugarloaf, feather grass-fescue steppe.	29	60
CP 3	Pavlodar region, Bayanaul district, N50.2209°, W75.8009°, h=406 m above sea level	Slope foot, fossilized fescue-feather grass steppe.	29	90
CP 4	Akmola region, Erejmentau district, Mount Ereimentau, N51.65717°, W73.19056°, h=313 m above sea level	Slope foot, solonetsous sagebrush-feather grass steppe.	25	100
CP 5	Kostanay region, Shcherbakov district, N53.20453°, W64.21550°, h=193 m above sea level	Sparse pine forest on the sands.	20	30
CP 6	Kostanay region, Ozerny district, Novonezhenskoe forestry, quarter #21, N52.43971°, W64.09279°, h=213 m above sea level	Secondary psammophyte steppe in the place of an old fire.	38	100
CP 7	Kostanay region, Zarechny district, natural monument "Stone Lake", N52.28013°, W63.76616°, h=134 m above sea level	Northern slope to the lake basin, shrubby feather grass steppe.	23	100
CP 8	Akmola region, Katarkol district, N52.93287°, W70.49210°, h=431 m above sea level	Edge of birch-pine forest.	20	60

Note. GPS - general projective grass covering.

Table 2 – Composition of *Adonis Wolgensis* cenoflora

Species	1	2	3	4
1	2	3	4	5
<b>Equisetaceae</b> Rich. ex DC. family				
<i>Equisetum hyemale</i> L.	P	Lr	XM	Meadow
<b>Pinaceae</b> Spreng. ex Rudolphi family				
<i>Pinus sylvestris</i> L.	P	T	XM	Forest
<b>Ephedraceae</b> Dumert. family				
<i>Ephedra distachya</i> L.	P	Sh	X	Steppe
<b>Ranunculaceae</b> Juss. family				
<i>Adonis Wolgensis</i> Steven	P	Shr	M	Steppe
<i>Pulsatilla flavescens</i> (Zucc.) Juz.	P	Shr	M	Steppe
<i>Pulsatilla patens</i> (L.) Mill.	P	Shr	M	Steppe
<i>Ranunculus polyanthemos</i> L.	P	F	M	Meadow
<i>Ranunculus polyrhizos</i> Steph.	P	F	M	Meadow
<b>Betulaceae</b> S. F. Gray family				
<i>Betula pendula</i> Roth	P	T	M	Forest
<b>Caryophyllaceae</b> Juss. family				
<i>Eremogone longifolia</i> (M.Bieb.) Fenzl	P	Lr	XM	Meadow
<i>Gypsophila paniculata</i> L.	P	Tr	XM	Steppe
<i>Otites wolgensis</i> (Hornem.)Grossh.	O-B	Tr	XM	Steppe
<i>Silene chlorantha</i> (Willd.) Ehrh.	P	Tr	M	Meadow
<b>Polygonaceae</b> Juss. family				
<i>Rumex acetosa</i> L.	P	Tr	M	Meadow
<b>Limoniaceae</b> Ser. family				
<i>Limonium gmelinii</i> (Willd.) Kuntze	P	Shr	XM	Steppe

Continuation of table 2				
1	2	3	4	5
<b>Tamaricaceae</b> Link family				
<i>Tamarix ramosissima</i> Ledeb.	P	Sh	XM	Steppe
<b>Primulaceae</b> Batsch ex Borkh. family				
<i>Androsace maxima</i> L.	E	Tr	GM	Steppe
<b>Brassicaceae</b> Burnett family				
<i>Alyssum desertorum</i> Stapf	E	Tr	GM	Steppe
<i>Draba nemorosa</i> L.	E	Tr	GM	Steppe
<b>Salicaceae</b> Mirb. family				
<i>Populus tremula</i> L.	P	T	M	Forest
<b>Crassulaceae</b> J. St.-Hil. family				
<i>Sedum telephium</i> L.	P	Lr	M	Meadow
<b>Rosaceae</b> Juss. family				
<i>Amygdalus nana</i> L.	P	Sh	XM	Steppe
<i>Filipendula stepposa</i> Juz.	P	Tr	XM	Steppe
<i>Filipendula ulmaria</i> (L.) Maxim.	P	Tr	M	Meadow
<i>Filipendula vulgaris</i> Moench	P	Tr	XM	Steppe
<i>Fragaria vesca</i> L.	P	Lr	M	Meadow
<i>Fragaria viridis</i> (Duchesne) Weston	P	Lr	XM	Meadow
<i>Potentilla arenaria</i> Borkh.	P	Lr	X	Steppe
<i>Potentilla asiatica</i> (Th. Wolf) Juz.	P	Shr	XM	Steppe
<i>Potentilla bifurca</i> L.	P	Lr	XM	Meadow
<i>Potentilla canescens</i> Besser	P	Shr	XM	Steppe
<i>Potentilla humifusa</i> Willd. ex Schltld.	P	Shr	XM	Steppe
<i>Rosa acicularis</i> Lindl.	P	Sh	XM	Steppe
<i>Rosa majalis</i> Herrm.	P	Sh	XM	Forest
<i>Rosa spinosissima</i> L.	P	Sh	XM	Steppe
<i>Spiraea hypericifolia</i> L.	P	Sh	XM	Steppe
<b>Onagraceae</b> Juss. family				
<i>Oenothera biennis</i> L.	O-B	Tr	M	Weed
<b>Fabaceae</b> Lindl. family				
<i>Astragalus testiculatus</i> Pall.	P	Ssh	X	Steppe
<i>Caragana frutex</i> (L.) K.Koch	P	Sh	XM	Steppe
<i>Genista tinctoria</i> L.	P	Sh	Xm	Steppe
<i>Glycyrrhiza uralensis</i> Fisch.	P	Lr	M	Steppe
<i>Medicago falcata</i> L.	P	Tr	XM	Steppe
<i>Melilotus officinalis</i> (L.) Pall.	O-B	Tr	XM	Weed
<b>Valerianaceae</b> Batsch family				
<i>Valeriana tuberosa</i> L.	P	Tr	M	Steppe
<b>Dipsacaceae</b> Juss. family				
<i>Scabiosa isetensis</i> L.	P	Lr	XM	Steppe
<b>Apiaceae</b> Lindl. family				
<i>Ferula soongarica</i> Pall. ex Spreng.	P	Tr	M	Steppe
<i>Seseli ledebourii</i> G.Don	P	Shr	XM	Steppe



Continuation of table 2				
1	2	3	4	5
<i>Seseli libanotis</i> (L.) W.D.J.Koch	P	Tr	M	Meadow
<i>Xanthoselinum alsaticum</i> (L.) Schur	P	Shr	M	Meadow
<b>Asteraceae</b> Bercht. et J. Presl family				
<i>Achillea asiatica</i> Serg.	P	Lr	XM	Meadow
<i>Achillea millefolium</i> L.	P	Lr	M	Meadow
<i>Achillea nobilis</i> L.	O-B	F	XM	Steppe
<i>Achillea setacea</i> Waldst. & Kit.	P	Lr	XM	Steppe
<i>Ancathia igniaria</i> (Spreng.) DC.	O-B	Tr	X	Steppe
<i>Artemisia absinthium</i> L.	P	Shr	XM	Weed
<i>Artemisia austriaca</i> Jacq.	P	Lr	XM	Steppe
<i>Artemisia campestris</i> L.	P	Tr	XM	Steppe
<i>Artemisia commutata</i> Besser	P	Tr	XM	Steppe
<i>Artemisia compacta</i> Fisch. ex DC.	P	Tr	XM	Steppe
<i>Artemisia dracunculus</i> L.	P	Lr	XM	Meadow
<i>Artemisia filatovae</i> Kupr.	P	Tr	XM	Steppe
<i>Artemisia frigida</i> Willd.	P	Ssh	XM	Steppe
<i>Artemisia nitrosa</i> Weber	P	Lr	XM	Steppe
<i>Artemisia pauciflora</i> Weber	P	Tr	X	Steppe
<i>Artemisia schrenkiana</i> Ledeb.	P	Tr	X	Steppe
<i>Carduus crispus</i> L.	O-B	Tr	XM	Weed
<i>Carduus nutans</i> L.	O-B	Tr	XM	Weed
<i>Centaurea marschalliana</i> Spreng.	P	Tr	XM	Steppe
<i>Centaurea scabiosa</i> L.	P	Tr	XM	Weed
<i>Echinops sphaerocephalus</i> L.	O-B	Tr	M	Weed
<i>Galatella</i> sp.	P	Lr	XM	Steppe
<i>Galatella tatarica</i> (Less.) Novopokr.	P	Lr	XM	Steppe
<i>Hieracium umbellatum</i> L.	P	F	XM	Forest
<i>Jacobaea erucifolia</i> (L.) Gaertn., Mey. et Scherb.	P	Shr	M	Meadow
<i>Jacobaea vulgaris</i> Gaertn.	O-B	Tr	XM	Weed
<i>Jurinea multiflora</i> (L.) B.Fedtsch.	P	Lr	X	Steppe
<i>Saussurea salsa</i> (Pall. ex M.Bieb.) Spreng.	P	Tr	XM	Steppe
<i>Scorzonera ensifolia</i> M.Bieb.	P	Shr	X	Steppe
<i>Serratula cardunculus</i> (Pall.) Schischk.	P	Lr	XM	Steppe
<i>Solidago virgaurea</i> L.	P	Shr	M	Forest
<i>Taraxacum officinale</i> F.H.Wigg.	O-B	Tr	M	Weed
<b>Rubiaceae</b> Juss. family				
<i>Galium verum</i> L.	P	Shr	XM	Steppe
<b>Boraginaceae</b> Juss. family				
<i>Onosma simplicissima</i> L.	P	Lr	XM	Steppe
<b>Scrophulariaceae</b> Juss. family				
<i>Linaria vulgaris</i> Mill.	P	Lr	M	Weed
<i>Verbascum phoeniceum</i> L.	P	Tr	XM	Steppe
<i>Veronica incana</i> L.	P	Lr	X	Steppe

Continuation of table 2				
1	2	3	4	5
<i>Veronica longifolia</i> L.	P	Lr	M	Meadow
<i>Veronica spicata</i> L.	P	Lr	XM	Steppe
<i>Veronica spuria</i> L.	P	Lr	XM	Steppe
<b>Lamiaceae</b> Martinov family				
<i>Phlomis tuberosa</i> (L.) Moench	P	Tr	XM	Steppe
<i>Thymus marschallianus</i> Willd.	P	Lr	XM	Steppe
<i>Thymus serpyllum</i> L.	P	Lr	XM	Steppe
<b>Liliaceae</b> Juss. family				
<i>Fritillaria ruthenica</i> Wikstr.	P	Br	M	Steppe
<i>Gagea fedtschenkoana</i> Pascher	P	Br	M	Steppe
<i>Gagea granulosa</i> Turcz.	P	Br	M	Steppe
<i>Tulipa biebersteiniana</i> Schult. & Schult. f.	P	Br	M	Steppe
<i>Tulipa patens</i> C.Agardh ex Schult. & Schult. f.	P	Br	M	Steppe
<b>Alliaceae</b> Borkh. family				
<i>Allium globosum</i> M.Bieb. ex Redoute	P	Br	XM	Steppe
<i>Allium nutans</i> L.	P	Br	XM	Steppe
<i>Allium strictum</i> Schrad.	P	Br	XM	Steppe
<i>Allium tulipifolium</i> Ledeb.	P	Br	M	Steppe
<b>Cyperaceae</b> Juss. family				
<i>Carex ericetorum</i> Pollich	P	Lr	XM	Steppe
<i>Carex pediformis</i> C.A.Mey.	P	Lr	XM	Steppe
<i>Carex</i> sp.	P	Lr	XM	Meadow
<i>Carex supina</i> Willd. ex Wahlenb.	P	Lr	X	Steppe
<b>Poaceae</b> Barnhart family				
<i>Achnatherum splendens</i> (Trin.) Nevski	P	Shr	XM	Steppe
<i>Agropyron cristatum</i> (L.) Beauv.	P	Shr	XM	Steppe
<i>Agropyron pectinatum</i> (M.Bieb.) Beauv.	P	Shr	XM	Steppe
<i>Bromopsis inermis</i> (Leyss.) Holub	P	Lr	M	Meadow
<i>Calamagrostis epigeios</i> (L.) Roth	P	Lr	XM	Meadow
<i>Elytrigia repens</i> (L.) Nevski	P	Lr	M	Weed
<i>Festuca valesiaca</i> Gaudin	P	Shr	X	Steppe
<i>Koeleria cristata</i> (L.) Pers.	P	Lr	X	Steppe
<i>Phleum phleoides</i> (L.) H.Karst.	P	Lr	XM	Steppe
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	P	Lr	M	Coastal-aquatic
<i>Poa angustifolia</i> L.	P	Lr	XM	Steppe
<i>Poa pratensis</i> L.	P	Lr	M	Meadow
<i>Stipa capillata</i> L.	P	Shr	X	Steppe
<i>Stipa pennata</i> L.	P	Shr	X	Steppe
<p><i>Note.</i>            Column 1 shows the life span of individuals (P – perennials, O-B – long-vegetating one-biennials, E – ephemera).            Column 2 shows the life forms (T - tree, Sh - shrub, Ssh - semi-shrub, Lr - long-root grasses, Shr - short-root grasses, Tr - tuberous grasses, Br - bulb grasses, Tr - taproot grasses, F - fibrous grasses).            Column 3 shows ecological groups in relation to the moisture availability of habitats (X - Xerophytes, XM - xeromesophytes, M - mesophytes, GM - gigromesophytes).            Column 4 shows ecological cenotic groups.</p>				

In the *Asteraceae* family, there have been found four species of the *Achillea* genus and eleven species of the *Artemisia* genus. This indicates that the cenoflora on the one hand has a meadow-steppe character, and on the other, includes solonchetsous habitats. The *Rosaceae* family has five species of the *Potentilla* genus and three species of the *Rosa* genus.

The composition of the leading families does not include *Caryophyllaceae* and *Brassicaceae*, but the *Ranunculaceae* and *Liliaceae* families have a higher rank in comparison with the spectrum of the flora leading families of all Kazakh hills.

The noted changes give the *Adonis Wolgensis* cenoflora a more boreal character than the steppe flora of the Central-Kazakhstan hills [7], thus, it is more characteristic of the Eastern Europe flora [8]. These features of cenoflora correlate well with the ecological conditions of shrub thickets in which *Adonis Wolgensis* populations emerge - with greater protection from drying and a smooth change of temperatures much lower than in open steppe areas.

The basis of the cenoflora is perennial plants (96 species). One-biennial plants are represented by 13 species, which is 11% of the species composition of the cenoflora. The latter group consists of long-vegetating one-biennials (10 species) and ephemerals - annuals with a short vegetation period (3 species). An insignificant part of one-biennials' participation in the composition of the cenoflora is characteristic of meadow-steppe cenofloras. A group of long-growing one-biennials mostly consists of weed plants, which reflects anthropogenic effects on the cenoflora.

As for the life forms, long-root grasses (38 species) predominate in composition of the cenoflora. They are represented mainly by long-term meadow-steppe plants. Taproot plants (24 species) are represented mainly by steppe species and one-biennial weeds. Short-root perennial herbs are represented by 22 species. The cenoflora also has a significant proportion (9 species) of tuberous grasses, which reflects the zonal conditions of the steppe with a strong summer drought. A rather large proportion (8%, 9 species) is represented by shrubs, which reflects the peculiarities of the habitat of *Adonis Wolgensis*.

Concerning factor of moistening, the cenoflora is formed by mezoxerophytes (63 species) and mesophytes (38 species). The predominance of mezoxerophytes and mesophytes is easily explained by the habitat of cenopopulations in shrubby thickets and along the edges of small-leaved and pine forests, and by the peculiar microclimate that they make. It is noteworthy, that the participation of xerophytes is comparatively small (14 species), and this fact again indicates the mesocerotrophic character of the *Adonis wolgensis* cenopopulations.

While analyzing the cenoflora composition by ecological cenotic groups, selection of groups and reference of specific species to a certain group were made on the basis of predominant occurrence of one or another species in various locations of *Adonis Wolgensis*. Thus, the species belonging to a particular ecological cenotic group reflects here its predominant occurrence in one or another vegetation type and its local ecological "preferences".

The core of cenoflora is represented by the species of zonal steppe type (80 species), which actually characterizes the *Adonis Wolgensis* cenopopulations. Meadow species have a subordinate position (22 species) and they are not regular in the composition of cenoflora, as well as forest (6 species) and coastal-aquatic (1 species). Weed species are not numerous (8 species), which indicates a moderate anthropogenic impact.

Only 8 species have a prevalence of more than 50% among 8 studied communities. They are steppe species *Stipa capillata* and *Festuca valesiaca*, which again speaks about a steppe nature of the cenoflora. There was noted a high occurrence (62.5%) of *Spiraea hypericifolia*, which emphasizes that the cenoflora belongs to shrubberies. Among other species with high occurrence there are *Onosma simplicissima*, *Phlomis tuberosa*, *Potentilla humifusa*, *Calamagrostis epigeios*, *Bromopsis inermis*.

**Conclusion.** *Adonis Wolgensis* Steven is located in Northern Kazakhstan near the north-eastern border of the area. There it occupies a rather wide ecological niche in the thickets of steppe shrubs and on the edges of deciduous and pine forests. In these conditions, *Adonis* acts as an assessor, and in some cases as a dominant early spring species of steppe communities. Despite the area is considerably vast, the cenoflora of these communities is not great, but quite diverse in species composition. Systematic structure and ecological groups' composition of the cenoflora do not differ significantly from the flora of Northern and Central Kazakhstan. It reflects particularity of the shrub thickets in steppe zone of Northern Kazakhstan, and moreover a relatively high humidity of the substrate and the air, and a greater snow accumula-

tion in winter. Spectrum of life forms and composition of ecological cenotic groups reflect the influence of zonal steppe communities. The peculiarity of modern ecological niche occupied by *Adonis* is emphasized by a small, but characteristic group of meadow plants found in the communities of shrub thickets in Northern Kazakhstan. Currently, the cenopopulation of *Adonis Wolgensis* retains its ability for self-sustain and regeneration within the occupied ecological niche with a little anthropogenic load.

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#### СОЛТҮСТІК ҚАЗАҚСТАНДАҒЫ ЕДІЛ ЖАНАРГҮЛІНІҢ (*ADONIS WOLGENSIS* STEV.) ЦЕНОФЛОРАСЫ

**Аннотация.** Мақалада Солтүстік Қазақстандағы Еділ жанаргүлінің (*Adonis wolgensis* Stev.) ценофлорасын зерттеу нәтижелері келтірілген. Материалдар далалық зерттеулер нәтижесінде алынды, әдеби деректер ескерілді. Нақтылы-маршрутты зерттеулер негізінде Солтүстік Қазақстандағы Еділ жанаргүлі флорасының тізімі келтіріледі. Систематикалық құрылым, тіршілік нысандары мен экологиялық топтарының құрамы, сонымен бірге даралардың тіршілік ұзақтығы мен экология-ценотикалық топтар бойынша ценофлораның талдауы *Adonis wolgensis* популяцияларының қазіргі жағдайының ерекшеліктерін және өсімдік жамылғысы құрамындағы орнын анықтады. Ценофлора систематикалық құрылымы мен экологиялық топтарының құрамы бойынша Солтүстік және Орталық Қазақстанның флорасынан айтарлықтай ерекшеленбейді және Солтүстік Қазақстанның далалы аймағындағы бұталы тоғайлардың ерекшелігін көрсетеді. Тіршілік нысандарының спектрі және экология-ценотикалық топтардың құрамы аймақтық далалы бірлестіктердің әсерін көрсетеді. Еділ жанаргүлімен қамтылған экологиялық деңгейдің өзгешілігі Солтүстік Қазақстанда бұталы тоғайлар бірлестіктерінде кездесетін шалғынды өсімдіктер тобымен анықталады. Қазіргі уақытта Еділ жанаргүлінің ценопопуляциясы алатын экологиялық деңгей аясында шағын антропогендік жүктемеде өз қалпына келуіне қабілеттілігін сақтайды.

**Түйін сөздер:** *Adonis wolgensis* Stev., ценопопуляция, Солтүстік Қазақстан, систематикалық құрылым, экология-ценотикалық топтар.

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### ЦЕНОФЛОРА АДОНИСА ВОЛЖСКОГО (*ADONIS WOLGENSIS* STEV.) В СЕВЕРНОМ КАЗАХСТАНЕ

**Аннотация.** В статье приведены результаты изучения ценофлоры адониса волжского (*Adonis wolgensis* Stev.) в Северном Казахстане. Материалы получены в результате полевых исследований, учтены литературные данные. На основании детально-маршрутных исследований приводится список флоры адониса волжского в Северном Казахстане. Анализ ценофлоры по систематической структуре, составу жизненных форм и экологических групп, а также длительности жизни особей и эколого-ценотическим группам выявил особенности современного состояния популяций *Adonis wolgensis* и их положение в составе растительного покрова. По систематической структуре и составу экологических групп ценофлора существенно не отличается от флоры Северного и Центрального Казахстана, она отражает специфику кустарниковых зарослей степной зоны Северного Казахстана. Спектр жизненных форм и состав эколого-ценотических групп отражает влияние зональных степных сообществ. Своеобразие современной экологической ниши, занимаемой адонисом волжским, подчеркивается группой луговых растений, встречающихся в Северном Казахстане в сообществах кустарниковых зарослей. В настоящее время ценопопуляция адониса волжского сохраняет способность к самоподдержанию и восстановлению в пределах занимаемой экологической ниши при наличии небольшой антропогенной нагрузки.

**Ключевые слова:** *Adonis wolgensis* Stev., ценопопуляция, Северный Казахстан, систематическая структура, эколого-ценотические группы.

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