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NEW LOCALITIES OF ENDEMIC AND RELIC SPECIES OF FLORA IN EAST KAZAKHSTAN

Abstract. One of the ways to preserve rare species of relic and endemic plants is protecting their habitats and phytocenoses in which these species exist at the present time. In connection with this now, in the era of sharp increase in anthropogenic stress, it is important to study flora and vegetation, to find new habitats of rare plant species in the mountainous regions of Kazakhstan, to draw up maps of their distribution area and take specific measures of protection. The purpose of this work is to study the geographical distribution of rare endemic and relict flora species of Eastern Kazakhstan. Materials for the study were collected during expeditions in 2012-2017. The study of the distribution of rare endemic and relict plants was carried out by a route-reconnaissance method. Routes of field research were planned according to cartographic forest inventory materials of land use and administrative maps of the East Kazakhstan region. The route of the expedition was compiled in such a way as to visit the most probable and characteristic places of growth of the studied plant species. The studies were conducted according to generally accepted methods: while describing plant communities with the participation and dominance of the plant species under study, conventional geo-botanical methods were used. As a result of the research new locations of rare, endemic and relict plant species have been discovered on East Kazakhstan territory. The new growth sites for *Daphne altaica, Sibiraeaaltaiensis* and *Amygdalusledebouriana* were determined. When registering the finds their exact coordinates were determined, the names of the tracts, the exposition of slopes and other necessary information was indicated.

Key words: endemics, relics, areal, distribution, mapping.

At present, there is a significant depletion of the gene pool of plants of the natural flora, and especially relic and endemic species, most of which are rare and are on the verge of extinction. Relict species of plants are of great scientific interest, since they are carriers of reliable information on the vegetation cover of past epochs [1].

One of the ways of preserving rare species of relic and endemic plants is the protection of their habitats and phytocenoses in the composition of which they are included. In connection with this, now, in the era of sharp increase in anthropogenic stress, it is important to study flora and vegetation, find new habitats of rare plant species in the mountainous regions of Kazakhstan, draw up maps of their distribution range and take specific measures of protection.

The purpose of this work is to study the geographical distribution of rare endemic and relict flora species of Eastern Kazakhstan.

Materials for the study were collected during expeditions in 2012-2017. The study of the distribution of rare endemic and relict plants was carried out by a route-reconnaissance method. Routes of field research were planned for cartographic forest inventory materials of land use and administrative maps of the East Kazakhstan region. The route of the expedition was compiled in such a way as to visit the most probable and characteristic places of growth of the studied plant species.

The studies were carried out according to generally accepted methods: in the description of plant communities with participation and dominance of the plant species under study, the generally accepted

geobotanical methods were used. B. A. Bykov [2]; E. M. Lavrenko [3]. Authors of taxa are cited in accordance with the rules adopted in the summary of S. K. Cherepanov [4], S. A. Abdulina [5].

The location of the thickets was established, guided by the biological characteristics and ecological confinement of the species under study, as well as using herbarium material.

Authenticity of plants was determined with the help of works "Flora of Kazakhstan" [6-9], "Illustrated determinant of plants of Kazakhstan" [10].

Conducted in recent years (2012-2017) in the East Kazakhstan region, flora studies have made it possible to identify new habitats of endemic and relict plant species. For the three species, new habitats have been determined, when registering the finds, their exact coordinates have been determined, the names of the tracts, the exposition of the slopes and other necessary information have been indicated.

Daphne altaica Pall. A kind of shrubs of the genus *Daphne* of the family *Thymelaeaceae*. The narrow endemic of Altay and adjoining mountains south of the Zaisan depression (Saur, Tarbagatay), relict of the tertiary forest subtropical flora of the Turgan type, the species is listed in the Red Data Book [11].

Daphne altaica root shoots deciduous shrub in height 1-1,5 cm. With brown, from below dark-gray bark, well recognizable by forked form of branches. Young branches are pubescent, old naked. The leaves are large, elliptical, entire. Blooms in the fifth year of life. Flowers are bisexual, with a simple perianth, sitting in groups (three to seven) at the ends of shortened branches. Perianth is snow-white, ridge-pale, with a cylindrical tube and four deflected rounded bends. Flowers have a strong pleasant aroma and a little like lilac flowers, only smaller. Blossoms in May - June, fruits (juicy black bone with single seeds) ripen in June - July [6].

It grows on the northern slopes of the mountains and in the foothills, in deciduous forests, bushes, rarely enters the shrub steppes. The main threats are grazing and fires. It occurs in Altay, Saur, Manyrak, Tarbagatay.

Daphne altaica has a medicinal value, it is used in folk medicine, the plant is poisonous.

Conducted in recent years (2012-2017) in the East Kazakhstan region, flora studies have revealed new habitats of the *Daphne altaica*[12, 13].

On the ridge Naryn at the foot of the mountain Atzhal there are large thickets. The eastern slopes of Mount Atzhal, along the gorges with coordinates N 49^0 05.505'; E 084^0 29.143' are covered with dense shrub vegetation from *Spiraeatrilobata L., S. media* Schmidt., *Rosa acicularis* Lindl., *Rosa alberti* Regel., *Lonicera tatarica* L., *Cotoneaster melanocarpa* Lodd., *Rubusidaeus* L., *Daphne altaica* Pall., *Amygdalusledebouriana* Schlecht. Under the canopy of the bushes a rich species diversity of herbaceous vegetation is developed.

Shrub dense thickets stretch along the southeastern slope to a height of 1300-1500 m. At the level of 1200 m, aspen groves appear on the slopes of northwestern exposures in the first tier, in the second tier the bushes *Spiraeatrilobata* L., S. *media* Schmidt., *Rosa acicularis*, *Rosa alberti* Regel., *Lonicera tatarica* L., L. altaica L., *Cotoneaster melanocarpa* Lodd., *Daphne altaica* Pall., R. *idaeus* L. From herbaceous vegetation, *Artemisia absintium* L., A. *vulgare* L., *Thalictrum collinum* Wallr., *Liliumpilosiusculum* (Freun) Miscz, *Origanum vulgare* L., *Medicago valcata* L., *Aconitum volubile* Pall. ex Koelle, *Thermopsislanceolata* R. Br., *Campanula glomerata* L., *Hypericum perforatum* L., *Rubussaxatilis* L., *Crepissibirica* L., *Centaurea ruthenica* Lam., *Orobus luteus* L., *Delphinium elatum*L., *Aconitum leucostomum* Worosch.

We discovered a *Daphne altaica* population in the eastern part of the Kalbinsk ridge on Mount Sandyktas. The population is located on the south-eastern slope at an altitude of 1056-1062 m above sea level. The total area of the population is 0.2 hectares, coordinates N $49^0$17.908′; E $082^0$29.*819′*(picture).

The Daphne altaica is found among dense shrub vegetation from Lonicera tatarica L., Caragana arborescens Lam., R. spinosissima L., Rosa acicularis Lindl., Rosa alberti Regel., Cotoneaster melanocarpa Lodd., Daphne altaica Pall. Among the foci there are some herbaceous species, Clematis integrifolia L., Dictamnusangustifolius G.Don ex Sweet., Delphinium cyananthum Nevski., Fragariaviridis (Duch.) Weston, Trifoliumlupinaster L., Filipendula vulgaris Moenh., Potentilla recta L., Phlomoidestuberosa (L.) Moench., Galiumverum L. and etc.

Sibiraeaaltaiensis (Laxm.) Schneid. *shrub RosaceaeJuss. family, about 150 cm tall. The branches are relatively thick, characterized by a reddish-brown bark. The leaves are sessile, bluish-green, whole and entire. Flowers unisexual, collected in separate racemose-paniculate inflorescences. Sepals and petals, like all Rosaceae, five. Calyx widely bell-shaped, corolla white. The fruit consists of five upright*

Flowering *Daphne altaica* on the Kalbinsk Ridge

leaflets (longer than the cup), each containing two small brown seeds. Seed reproduction. Blooms Siberaea in May-June, fructifies in July-August [7].

A rare, endangered species, the endemic of Altay, the distribution of which only slightly exceeds the boundaries of Kazakhstan. It grows in open mountain valleys and on the slopes of the mountains.

Leaves are sometimes used as a substitute for tea, but in folk medicine in the treatment of fever, liver disease (hepatitis) and the cardiovascular system. Sibiraeaaltaiensis is an effective ornamental plant, grows well in seeds from seeds. It is very attractive not only during flowering, but also in autumn, when the leaves are painted in bright crimson colors. It is protected in the Katon-Karagai State National Park [14].

Quite large thickets of Altay endemic are found in the *Sibiraeaaltaiensis* on the ridge of Tarbagatay of Southern Altay, on the right bank of the Taldybulak river at an altitude of 1816 m above sea level with coordinates N $49^0$06.355`, E $086^0$07.890`.

Cenopopulations with the participation of *Sibiraeaaltaiensis* are grouped in a*herbage-bush* type of phytocenosis, which occurs along the right bank of the Taldybulak River. The shrub layer is dense, well developed. Of the shrubs - *Sibiraeaaltaiensis*, *Pentaphylloidesfruticosa* (L.) O.Scywarz, *Salix sajanensis* Nas., *Spiraea media* Franz Schmidt. From forbs are found: *Polygonum viviparum* L., *Geranium pretense* L., G. *divaricatum Ehrh*., G. *sibiricum* L., *Lamium album* L., *Galiumverum* L., G. *boreale* L., *Myosotis palustris* (L.) L. , *Thalictrum flanum* L., *Veronica longifolia* L., *Ligulariaaltaica* DC, *Alchimillasibirica* L., *Papaver medicaule* L., *Polygala hybrida* DC., *Valerianadubia* Bunge., *Polemoniumcaeruleum* L., *Viceatenuifolia* Roth, *Campanula glomerata* L., *Trolliusaltaicus* CAMey., *Dracocephalumruyschiana* L., *Dracocephalumintegrifolium* Bunge, *Pyrethrum krylovianum* Krasch., *Aconitum leucostomum* Worosch. and etc.

A large population of *Sibiraeaaltaiensis* is found on the slopes of the southern and south-eastern exposition of Mount Shubartos of the Tarbagatay Range of the Southern Altay. at an altitude of 1870 m above sea level with coordinates N $49^0$06.564`, E $086^0$07.847`. Tests were made on 20 plants on an area of about 2.5 hectares.

Cenopopulations with the participation of *Sibiraeaaltaiensis* are grouped into a *herbage-shrubby-siberian* type of phytocenosis, which occurs along the slopes of southern and south-eastern exposures. The shrub layer is dense, well developed. Of the bushes - *Rosa alberti* Regel., R. *acicularis* Lindl, *Sibiraeaaltaiensis*, *Spiraea media* Franz Schmidt. Herbal cover consists of *Dactylisglomerata* L., *Poapratensis* L., *Koeleriaaltaica* (Domin) Kryl., *Alopecuruspratensis* L., *Lilium martagon* L., *Thalictrum alpinum* L., *Pedicullariselata* Willd., *Dracocephalumruyschiana* L., *Trolliusaltaicus* CA Mey., *Bupleurum aureum* Fisch., *Galiumverum* L., G. *boreale* L., *Medicago falcata* L., *Ligulariaaltaica* DC, *Viceate-nuifolia* Roth, *Hedysarumneglectum* Ledeb. and etc.

On the slope of Mount Shubartos *Sibiraeaaltaiensis* rises to an altitude of 1892-1899 m above sea level along the slopes of the southern, south-eastern exposure.

Sibiraeaaltaiensis is found on the ridge of the Southern Altay on the slopes of the Shubarkaragai mountain. The *Sibiraeaaltaiensis* saplings occupy a considerable area along the eastern and south-eastern slopes at an altitude of 1693 m above sea level with coordinates N $49^0$03.436`, E $086^0$00.179`.

Of the tree species Larixsibirica is encountered, the shrubby vegetation is represented by continuous thickets of *Sibiraeaaltaiensis*, with an admixture of *Spiraea media* Franz Schmidt, *Pentaphylloides-fruticosa* (L.) O.Scywarz,, *Cotoneaster uniflorus* Bunge. The herbaceous stage is represented by *Dactylis-glomerata* L., *Calamagrostisepigeios* (L.) Roth, *Poasibirica* Roshev., *Chamaenerionangustifolium* (L.) Scop., *Geranium albiflorum* Ledeb., *Thalictrum alpinum* L., *Trolliusaltaicus* CAMey., *Myosotis palustris* (L .) L., *Lathyruspratensis*L., *Stellariapalustris* Retz., *Galiumboreale* L., *Alchemilla altaica* Juz., *Sanguisorbaalpina* Bunge., *Antennaria*dioica (L.) Gaertn., *Saussureafrolowii* Ledeb., *Euphorbia lutescens* CFMey., *Phlomoidesalpina* Pall., *Hedysarumalpinum* L., *Veratrum lobelianum* Bernh., *Gentianafetissowii* Regel & Winkl., *Trolliusaltaicus* CAMey., *Dracocephalumruyschiana* L. *Swertiaobtusa* Ledeb., *Thermopsislanceolata* R. Br., *Scaligeriasetacea* (Sehrenk.) Korov. andetc.

Amygdalusledebouriana Schlecht., bush of the family *Rosaceae Juss*. A rare, endemic species, is listed in the Red Book of Kazakhstan.

The height of the shrub reaches 1,5-1,8 m. The branches are glabrous, spread out, with numerous shortened branches. The cortex of perennial branches is gray or cranate-gray, annual reddish-brown, stipules narrow-lanceolate or lanceolate, entire-toothed or dentate. Leaves are regular, on shorter shoots sit in bundles, all naked, lanceolate or oblong-ovoid, apically pointed, less often obtuse, at the base gradually narrowed into a short stalk, along the edges serrate-dentate. Flowers are bright pink, solitary. Blossoms in late May. The fruits are thickly felt and furry. It grows in the grassy-meadow steppe, on mountain slopes, in river valleys [7,8].

We found it on the northeastern shrub of the town of Saryshoky, the Naryn Ridge, the Southern Altay Range, in the vicinity of the Kokterek village of the Katon-Karagai District, N 49^0 05.537', E 084^0 29.165', at an altitude of 724 m above sea level [15].

The northeastern slopes of the Saryshoky mountain, the gorges are covered with dense shrubby vegetation from *Spiraeatrilobata* L., S. *media* Schmidt., *Amygdalusledebouriana* Schlecht., *Rosa acicularis* Lindl., *Rosa alberti* Regel., *Lonicera tatarica* L., *Cotoneaster melanocarpa* Lodd., *Rubusidaeus* L., *Daphne altaica* Pall. Under the canopy of the bushes a rich species diversity of herbaceous vegetation is developed. From herbaceous vegetation there are *Artemisia absintium* L., *A. vulgare* L., *Thalictrum collinum* Wallr., *Liliumpilosiusculum* (Freun) Miscz, *Origanum vulgare* L., *Medicago valcata* L., *Aconitum volubile* Pall. ex Koelle, *Thermopsislanceolata* R. Br., *Campanula glomerata* L., *Hypericum perforatum* L., *Rubussaxatilis* L., *Crepissibirica* L., *Centaurea ruthenica* Lam., *Orobus luteus* L., *Delphinium elatum* L., *Aconitum leucostomum* Worosch.

Thus, new locations *of Daphne altaica, Sibiraeaaltaiensis* and *Amygdalusledebouriana* have been established, in the territory of East Kazakhstan. All modern materials on the distribution of the above three types of flora of Eastern Kazakhstan are included in the electronic database of the East Kazakhstan State University.

For the three species, new growth sites have been identified, which will be indicated on the maps of their distribution areas. When registering the finds, their exact coordinates were determined, the names of the tracts, the exposition of the slopes and other necessary information were indicated.

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НОВЫЕ МЕСТООБИТАНИЯ ЭНДЕМИЧНЫХ И РЕЛИКТОВЫХ ВИДОВ РАСТЕНИЙ ФЛОРЫ ВОСТОЧНОГО КАЗАХСТАНА

Аннотация. Одним из путей сохранения редких видов реликтовых и эндемичных растений является охрана их местообитания и фитоценозов, в состав которых они входят. В связи с чем, ныне, в эпоху резкого усиления антропогенного стресса, актуально изучение флоры и растительности, нахождение новых местообитаний редких видов растений в горных районах Казахстана, составление карт их ареала распространения и принятие конкретных мер охраны. Целью данной работы явилось изучение географического распространения редких эндемичных и реликтовых видов флоры Восточного Казахстана. Материалы для исследования собирались во время экспедиций 2012-2017 гг. Изучение распространения редких эндемичных и реликтовых растений осуществлялось маршрутно-рекогносцировочным методом. Маршруты полевых исследований намечали по картографическим лесоустроительным материалам землепользования и административным картам Восточно-Казахстанской области. Маршрут экспедиции был составлен с таким расчетом, чтобы посетить наиболее вероятные и характерные места произрастания изучаемых видов растений. Исследования проводились по общепринятым методикам: при описании растительных сообществ с участием и доминированием изучаемых видов растений были использованы общепринятые геоботанические методы. В результате проведенных исследований на территории Восточного Казахстана обнаружены новые местонахождения редких, эндемичных и реликтовых видов растений. Определены новые места произрастания для *Daphne altaica*,*Sibiraea altaiensis* и *Amygdalusledebouriana,* при регистрации мест находок определились их точные координаты, указывались названия урочищ, экспозиция склонов и другие необходимые сведения.

Ключевые слова: эндемики, реликты, ареал, распространение, картирование.

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ШЫҒЫС ҚАЗАҚСТАН ФЛОРАСЫНЫҢ ЭНДЕМИК ЖӘНЕ РЕЛИКТ ӨСІМДІКТЕРІНІҢ ЖАҢА МЕКЕН ОРЫНДАРЫ

Аннотация. Реликт және эндемик түрлерді тіршілік ететін орындары мен олар құрамына енетін фитоценоздарды қорғауға алу оларды сақтаудың бірден-бір жолы. Сол себепті, қазіргі таңда, антропогендік стресстің күрт күшеюі дәуірінде флораны және өсімдіктер жамылғысын зерттеу, Қазақстанның таулы аймақтарында сирек кездесетін өсімдіктердің мекен ететін жаңа орындарын табу, олардың таралу ареалдарының картасын түзу және оларды қорғау шараларын ұсыну өзекті мәселелердің бірі. Берілген жұмыстың мақсаты, Шығыс Қазақстан флорасының эндемик және реликт өсімдіктерінің географиялық таралу аймақатарын анықтау. Зерттеу материалдары 2012-2017 жылдары жүргізілген экспедициялар уақытында жиналды. Сирек кзедесеттін эндемик және реликт өсімдіктерді зерттеу маршруттық-рекогносциялау әдісімен жүргізілді. Далалық зерттеулердің маршруттары жер пайдалану картографиялық материалдары мен Шығыс Қазақстан облысының әкімшілік карталарының көмегімен жасалды. Экспедициялардың маршруттары зерттеуге алынған өсімдік түрлерінің таралуы мүмкін болатын жерлерді неғұрлым кеңінен қамтыды. Зерттеулер жалпыға мәлім әдістер көмегімен жүргізілді, өсімдіктер жамылғысына сипаттамалар геоботаникалық әдістермен жүргізілді. Зерттеу нәтижесінде Шығыс Қазақстан облысының аумағында сирек кездесетін эндемик және реликт түрлердің мекен ететін жаңа орындары анықталды. *Daphne altaica*, *Sibiraea altaiensis* және *Amygdalus ledebouriana* түрлерінің жаңа мекен ететін орындары анықталды, олар табылған жерлердің нақты координаттары анықталып, сайлардың аттары, тау беттерінің экспозициясы және т.б. қажетті мағлұматтар көрсетілді.

Түйін сөздер: эндемик, реликт, ареал, таралу, картаға түсіру.