ADDITIONS TO THE FLORA OF THE REPUBLIC OF MORDOVIA, RUSSIA

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Abstract: Biodiversity conservation relies upon our knowledge of the complete inventory of plants and animals within a certain area. In this paper, we present data from biodiversity research in the Republic of Mordovia (European Russia). The results obtained are reflected in the discovery of six vascular plants for the first time in the studied region. Of these, four alien taxa (*Philadelphus coronarius*, *Rosa* × *majorugosa*, *Spiraea japonica*, *Syringa josikaea*) are at present known only in the Mordovia State Nature Reserve. This underlines the need to pay attention to alien plants that escape into the wild (naturalize) in the least disturbed ecosystems of this Protected Area. The distribution of *Urtica galeopsifolia* needs to be clarified in more detail because of its similarity to the widely known *Urtica dioica*. Thus, the majority of the species under discussion are alien plants considered to have escaped into the wild, in the case of *Verbascum densiflorum* from a botanic garden. Taking into account the newly revealed species, the vascular plant flora of the Republic of Mordovia currently includes 1,472 species. In this research, we propose to continue the study of man-made habitats in terms of accidentally or intentionally introduced alien species, as well as the search for critical taxa, such as *Urtica galeopsifolia* found in this study.

Keywords: alien species, biogeography, citizen science, cultivated species, new species records, European Russia.

Introduction

Biological diversity research is widely recognized as a primary step for understanding the biology and ecology of plants and animals in many regions of the world [2, 9, 13, 19]. New records of plants and animals in particular countries, smaller regions or Protected Areas [1, 4, 23] serve as a basis for additions to lists of plants and animals that enable creation of taxonomic checklists. In relation to Russia, as a broad and at the same time remote territory, such studies are crucial to obtain the complete list of taxa.

The Republic of Mordovia is characterized by the high-level knowledge of the vascular plant flora [14], which is true for its Protected Areas (Mordovia State Nature Reserve [21] and National Park “Smolny” [15]). Recently, additions to the flora of the Republic of Mordovia have been published [8, 11, 16, 17, 21, 24]. Taking these into account, up until now the vascular plant flora of the Republic of Mordovia consisted of 1,466 species.

Despite the high level of knowledge of the plant diversity in Mordovia, we believe that many alien and critical plants species are still not recorded in this area. This assumption coincides with the present study and recently published additions (e.g. [8]), where a considerable number of taxa were found for the first time for the relatively small area of the Republic of Mordovia. The

present paper aims to present data about vascular plants found for the first time in the flora of the Republic of Mordovia.

Material and Methods

The Republic of Mordovia is located on the edge of the forest and forest-steppe natural zones in the middle zone of European Russia. This region has area of about 26,200 km². The Republic of Mordovia is characterized by high habitat diversity. Coniferous and mixed (coniferous-deciduous) forests are situated predominantly in the western and north-western parts of Mordovia. Broadleaved forests are located in the centre and east of the region. The forest-steppe landscapes dominate in the eastern and south-eastern areas of the Republic of Mordovia [25]. In water bodies, 163 species and nine hybrids are known [14, 22]. Mires cover about 5% of the Mordovia's area, which is reflected in the high *Sphagnum* species diversity [7].

The present study is based on vascular plant locations found by intentional or accidental surveying of natural or man-made areas in the Republic of Mordovia. In particular, we made a special attention to the former (established in late 1940s and left without attention later) nursery for woody plants within the Mordovia State Nature Reserve.

The scientific names of plant species are used in accordance with POWO [12]. Each vascular plant species is attributed by family (according to [12]), lists of herbarium label citations and notes. For each location, we present the following information: country, Russian region, municipal district of the region, geographical coordinates, date of the record, name(s) of author(s), and herbarium acronym according to *Index Herbariorum* [20].

Results and Discussion

Philadelphus coronarius L. (Hydrangeaceae)

Locations: 1) Russia, Republic of Mordovia, Temnikov district, quarter 447 of the Mordovia State Nature Reserve, forest glade near the cordon Valzensky, 54.720207° N, 43.234252° E, 10.07.2021, I.G. Esina, A.A. Khapugin (HMNR).

Note: This ornamental shrub is naturally distributed in North Caucasus, Transcaucasus and Turkey [12], and widely cultivated in Europe, including European Russia. According to [10], no records of its escaping into the wild (naturalization outside cultivation) were registered, although *P. coronarius* is able to persist for a long time in the places where it was cultivated. In both Republic of Mordovia [14] and Mordovia State Nature Reserve [21], *Philadelphus coronarius* was recognized as an introduced plant unable to escape into the wild. However, we found about ten vegetatively reproduced individuals of *P. coronarius* near the cordon Valzensky, where this species was planted a long time ago. Our find points out the start of its dispersal out of the introduction area in the Mordovia State Nature Reserve.

Rosa × majorugosa Palmén & Hämet-Ahti (Rosaceae)

Locations: 1) Russia, Republic of Mordovia, Temnikov district, quarter 449 of the Mordovia State Nature Reserve, roadside in the settlement Pushta, 54.712612° N, 43.225879° E, 11.07.2021, A.A. Khapugin (HMNR).

Note: This is one of the most frequently occurring hybrids between *Rosa majalis* Herm. and *Rosa rugosa* Thunb. in the centre of European Russia [10]. However, we did not find direct published mention on the escape of this species into the wild in Russia. In the Republic of

Mordovia, *R. × majorugosa* is characterized as a rarely cultivated species that is not known outside of cultivation [14]. This species was never mentioned in the flora of the Mordovia State Nature Reserve, including cultivated plants [3, 21]. In the discovery location, *R. × majorugosa* forms a well established population (about 25 m²) growing by seed and vegetative reproduction.

***Spiraea japonica* L. (Rosaceae)**

Locations: 1) Russia, Republic of Mordovia, Temnikov district, former nursery for woody plants in the quarter 445 of the Mordovia State Nature Reserve, 54.721299° N, 43.205541° E, 08.07.2021, I.G. Esina, A.A. Khapugin (HMNR).

Note: This East Asian shrub is widely cultivated in European Russia [10] and Republic of Mordovia [14], while no data on its escape into the wild have been published. However, in the Mordovia State Nature Reserve, we found numerous vegetative and reproducing individuals escaped into the wild by forming a well-sustainable population at the area of about 40 m². Our finding reproducing individuals far outside the main area covered by the *S. japonica* population may be evidence of its further dispersal in the nursery for woody plants and natural forest communities around its area

***Syringa josikaea* Jacq. ex Reichb. (Oleaceae)**

Locations: 1) Russia, Republic of Mordovia, Temnikov district, former nursery for woody plants in the quarter 445 of the Mordovia State Nature Reserve, 54.721299° N, 43.205541° E, 08.07.2021, I.G. Esina, A.A. Khapugin (HMNR).

Note: This species, endemic to Ukraine and Transylvania, is recognized as exclusively a cultivated plant in the flora of the Republic of Mordovia [14] and central European Russia [10]. In the Mordovia State Nature Reserve, we found a number of young, vegetatively reproduced individuals located around the mother plant. Some of them look to be near transition to the flowering stage.

***Urtica galeopsifolia* Wierzb. ex Opiz (Urticaceae)**

Locations: 1) Russia, Republic of Mordovia, Ardatov district, edge of the forest near the pond at 150 m from the Lesozavod settlement, 54.816662° N, 46.020646° E, 06.06.2021, A.D. Sinichkina (HMNR); 2) Russia, Republic of Mordovia, Temnikov district, valley of the Bolshoy Aksel brook, willow thickets, 54.605122° N, 43.364818° E, 06.07.2021, I.G. Esina, A.A. Khapugin, M.N. Esin (HMNR); 3) Russia, Republic of Mordovia, Temnikov district, nettle-dominated glade in the alder (*Alnus glutinosa* (L.) Gaertn.) forest in the quarter 446 of the Mordovia State Nature Reserve, 54.717092° N, 43.221730° E, 18.07.2021, A.A. Khapugin (HMNR).

Note: We consider *U. galeopsifolia* to be an independent species following to the opinion of Geltman [5, 6], although some authors (e.g. [18]) consider it an infraspecific taxon of the widely distributed stinging nettle (*U. dioica* L.). This species is known in many regions of central European Russia [10], probably being confused with *U. dioica* s.str. However, we believe that special investigations of differences between taxa in the *Urtica dioica* group (according to [6]) are needed, because we noticed considerable variations in proportions of stinging and simple hairs among *Urtica* individuals in the Mordovia State Nature Reserve.

***Verbascum densiflorum* Bertol. (Scrophulariaceae)**

Locations: 1) Russia, Republic of Mordovia, Saransk urban district, western edge of the Lukhovka settlement, wasteland with thickets of *Heracleum sosnowskyi* Manden., 54.164631° N, 45.206133° E, 06.07.2021, T.B. Silaeva (GMU).

Note: This biennial or perennial plant is native to Europe and the Caucasus, being introduced in Baltic countries and some American countries [12]. According to [10], *V. densiflorum* is known in almost the entire area of the middle zone of European Russia, while there was no evidence of this species in the Republic of Mordovia until now [14]. The *V. densiflorum* individual has been found in the environs of the Botanical Garden of the Mordovia State University. Therefore, the plant found could be a result of its escape into the wild from the botanic garden by seed reproduction. But we cannot exclude its further discovery in natural habitats.

Conclusions

The data presented here have increased the current number of the vascular plant taxa of the Republic of Mordovia to 1,472. Additionally, some of these findings were supplemented by iNaturalist-observations (as in [8]). Among the surveyed species, *Urtica galeopsifolia* seems to be distributed much widely in the Republic of Mordovia. Its currently restricted number of locations could be explained by its being overlooked by regional researchers due to its high morphological similarity to *Urtica dioica*. At the same time, the *Verbascum densiflorum* population should be monitored annually with additional surveying for this species in natural habitats across the Republic of Mordovia and adjacent regions of Russia. For the future, we suggest continuing special research in relation to both diversity and distribution in Mordovia of both alien and native plant species. This especially relates to aliens due to the active dispersal of weeds and escape into the wild of cultivated plants.

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COMPLETĂRI LA FLORA REPUBLICII MORDOVIA, RUSIA

(Rezumat)

Conservarea biodiversității se bazează pe posibilitățile de a face un inventar complet al plantelor și animalelor dintr-o anumită regiune. Acest articol prezintă informații despre cercetările în ceea ce privește biodiversitatea din Republica Mordovia (Rusia Europeană). Rezultatele obținute se reflectă în identificarea a șase specii de plante vasculare studiate pentru prima dată în regiune. Dintre acestea, patru specii alohtone (*Philadelphus coronarius*, *Rosa* × *majorugosa*, *Spiraea japonica*, *Syringa josikaea*) se cunosc în prezent doar din Rezervația Naturală de Stat Mordovia. Acest lucru subliniază încă o dată atenția ce trebuie acordată plantelor alohtone, care se pot sălbătici (naturaliza) în cele mai puțin perturbate ecosisteme din această arie protejată. Distribuția speciei *Urtica galeopsifolia* trebuie să fie clarificată mai în detaliu, datorită similarității cu specia spontană *Urtica dioica*. Astfel, majoritatea speciilor luate în studiu sunt plante alohtone, considerate a fi scăpate în sălbăticie, în cazul lui *Verbascum densiflorum* dintr-o grădină botanică. Luând în considerare noile specii descoperite, flora plantelor vasculare din Republica Mordovia cuprinde în prezent 1,472 specii. În acest articol, propunem continuarea studiului habitatelor antropice în ceea ce privește introducerea intenționată sau accidentală a speciilor alohtone, precum și continuarea căutărilor pentru taxoni critici, precum *Urtica galeopsifolia*, găsit în acest studiu.

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