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## **PRELIMINARY CHECK-LIST OF INVASIVE ALIEN PLANT SPECIES IN NOVI SAD (VOJVODINA NORTH SERBIA)**

### **ПРЕДВАРИТЕЛЬНЫЙ СПИСОК ИНВАЗИВНЫХ АЛОХТОНИХ РАСТЕНИЙ В Г. НОВИ-САД (ВОЙВОДИНА СЕВЕРНАЯ СЕРБИЯ)**

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Following the latest trends of large European cities, this paper presents a preliminary check-list of invasive plants for Novi Sad. Through the processing of literature data and field research there are 72 adventive taxa occurring spontaneously in Novi Sad. Based on the reference lists for the given area, frequency and number of plants in the field, a preliminary list of 10 invasive and 10 potentially invasive taxa was compiled. There is a noticeable trend of increased presence of invasive plants with a larger number of public green areas between urban housing units. The most endangered zone is the peripheral part of the city that is in direct contact with the industrial zone, canal network, and agricultural areas.

Следуя последним тенденциям крупных европейских городов, в настоящем исследовании представлен предварительный список инвазивных растений г. Нови-Сад. На основе литературных данных и полевых исследований выявило наличие 71 адвентивных таксонов, спонтанно возникающих в г. Нови-Сад. На основе справочных списков для данной области, а также количества и наличия растений на местах был составлен предварительный список из 10 инвазивных и 10 потенциально инвазивных таксонов. Наблюдалась тенденция увеличения присутствия инвазивных растений с большим количеством общественных зеленых зон между городскими жилыми домами. Наиболее подверженная опасности зона – это периферийная часть города, которая находится в непосредственной близости с промышленной зоной, сетью каналов и сельскохозяйственными районами.

*Keywords:* invasive alien plant species, neophytes, preliminary check-list, urban flora.

*Ключевые слова:* инвазивные алохтоние растения, неофиты, предварительный список, флора городов.

Today, urban areas are characterized by higher species richness comparing to surrounding landscapes, especially in agricultural parts of Central Europe. Although many biotic and abiotic factors affect occurrence, dynamics and spreading of urban plant communities, constant human activities have caused similar environmental conditions in these areas, even in different biogeographical regions. Anthropogenic influence combined with specific ecological traits results in highly disturbed and unstable conditions in urban habitats, making them highly prone to introduction, naturalization, and invasion of allochthonous plants [1; 2; 5].

Invasive alien plants (IAS) are defined as a subset of naturalized alochthonous plants that produce a large number of reproducing offspring, relatively distant from parent plants. Sometimes these plants are able to transform natural ecosystems, acting as edicators, putting heavy pressure on native species and causing negative socio-economic impact. Most common species belonging to this group are introduced after 1500 AD and are classified as neophytes [1; 2].

The latest research on urban flora in this part of the world showed that the number of neophytes increased significantly with the size of an urbanized area [5]. Novi Sad is the second biggest city in Serbia and due to its geographical position,

size, long human history, and transportation network (the Danube river, roads rails), has been exposed to plant invasions ever since. Rat *et al.* (2017) compiled a list of 71 neophytes for Novi Sad, contributing with 21 % of total urban flora, what corresponds to average neophyte share in urban flora of Central European cities [1; 4; 5].

As indicated above, not all neophytes have invasive character and negative socio-economic impact. Nevertheless, creating a list of plants with these negative traits is the first step in prioritizing the processes of control and eradication of invasive plants in a certain area. Plants were included in the preliminary check-list of IAS in Novi Sad if they fulfil following criteria: (a) only naturalized alien plants with self-sustainable populations and casual alien plants were included (decorative and cultivated plants were excluded); (b) field research (August – October) was carried out only on city public area, including parts under maintenance on regular basis; (c) plants with invasive character were classified using referent literature for investigated area [3; 4] and modified according to the number of populations in field test-sites.

Based on these criteria a list of 10 invasive and 10 potentially invasive plant taxa was made, along with number of population occurrence and distributions maps for most frequent IAS (tabl.).

Table – List of invasive and potentially invasive plants of Novi Sad (test sites frequency)

Invasive	Potentially invasive
<i>Sorghum halepense</i> (74)	<i>Abutilon theophrasti</i>
<i>Erigeron canadensis</i> (61)	<i>Acer negundo</i>
<i>Ambrosia artemisiifolia</i> (54)	<i>Amorpha fruticosa</i>
<i>Amaranthus sp.</i> (38)	<i>Asclepias syriaca</i>
<i>Robinia pseudoacacia</i> (27)	<i>Catalpa speciosa</i>
<i>Ailanthus altissima</i> (20)	<i>Oenothera sp.</i>
<i>Aster tradescatni</i> (20)	<i>Parthenocissus quinquefolia</i>
<i>Erigeron annuus</i> (16)	<i>Persicaria orientalis</i>
<i>Helianthus tuberosus</i> (16)	<i>Phytolacca americana</i>
<i>Solidago sp.</i> (15)	<i>Reynoutria japonica</i>

According to city arrangement and presence of invasive plants, we divided urban area of Novi Sad as follows (a) City center wider area (b) City blocks; (c) Peripheral zone. The first zone is least affected by invasive plants, given the small proportion of green areas. Most common invasive plants occur near building sites, cracks in walls or as lianas. The second zone is characterized by planned constructed city blocks with significantly larger part of green areas. Despite regular maintenance (mechanical mowing) of public land in this zone, there are a considerably higher number of different taxa and their populations, rather than first zone. The last zone is most affected by invasive plants, as their population number, occurrence and abundance are highest in comparison to the former zones. Also, this zone is in direct connection with agricultural fields, industrial zones and river and canal network. Furthermore, there is drastically greater extent of untreated and vacant areas, characterized by unstable environment and different type of human influence, making them perfect for stable population growth of invasive species. We distinguished these types of habitats, following the utilization of soil from peripheral agricultural areas at building and construction sites, as one of the main factors for the continual presence of invasive plants in most urbanized parts of Novi Sad.

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