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DISTRIBUTION OF THE SPECIES *Reynoutria japonica* HOUTT. IN THE AREA OF THE CITY OF BANJA LUKA

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Summary

Reynoutria japonica Houtt. (syn.: *Fallopia japonica* (Houtt.) Ronse Decr.) is a herbaceous perennial dioecious plant native to Japan, China and Korea. The stems are numerous, erect and annual. The species was brought to Europe in the middle of the 19th century for the purposes of growing in gardens, but it spread very quickly and today it is one of the most invasive species in many European countries. It forms dense monodominant stands that crowd out native vegetation, posing a serious threat to biodiversity. In the researched area, the species *R. japonica* was recorded in 103 localities, and the largest number was found in the local communities of Obilićevo, Centar and Bulevar. Smaller stands with an area of up to 10 m^2 are mostly represented. So far, the data on the distribution of this species in the area of the city of Banja Luka are scarce, so the goal of this work was to record the localities where the species *R. japonica* grows, so that its populations could be monitored in the future.

Key words: invasive plant, city, spread

INTRODUCTION

The species *Reynoutria japonica* Houtt. (Polygonaceae), the Japanese knotweed, is a perennial herbaceous geophyte with a large underground shoot from which the above-ground parts of the tree grow up to 3 m high (Nikolić *et al*., 2014). It is a native species of East Asia, more precisely Japan, Korea, Taiwan, the Sakhalin Islands and northern China (Ainsworth and Weiss, 2002). It has been recorded in Europe since the 19th century, and was introduced as an ornamental plant primarily in botanical gardens and nurseries. On the European continent, it became naturalized in most countries already at the end of the 19th century (Alberternst and Bohmer, 2011). The first reference for Bosnia and Herzegovina comes from 1990, and it is mentioned in Sarajevo, Doboj and Derventa (Trinajstić, 1994). Today, the Japanese knotweed is on international lists as one of the worst invasive species in the world (EPPO, 2021). *R. japonica* grows extremely fast and forms dense and large monodominant stands, which crowd out native vegetation (Lániková, 2009; Maurel *et al*., 2010; Olden *et al*., 2016; Topalić-Trivunović and Šumatić, 2004). It grows in wet habitats, on the banks of rivers, along the edges of roads and in urban areas (Maurel *et al*., 2010). It is common in habitats rich in nitrogen, tolerates different soil acidity and does not suffer from heavy cutting (Nikolić *et al*.,

2014). Populations of *R. japonica*, especially in coastal zones, represent a great threat to objects and habitats with a special status of nature protection (ecological corridors Natura 2000), as well as to the economy (Claeson and Bisson, 2013; Gerber *et al*., 2008; Tokarska-Guzik *et al*., 2006). The main form of plant spread is the transfer of soil contaminated with underground shoots from one location to another, especially during construction or similar works. The most common method of removal is mowing (Jones *et al*., 2020), application of herbicides and burning, with the latter two methods not recommended in urban areas and near watercourses (Jones *et al*., 2018).

For the area of Banja Luka, there is a small number of works on the distribution of the *R. japonica* species. According to Topalić-Trivunović and Šumatić (2004), in the territory of the city of Banja Luka *R. japonica* was recorded in 18 locations whose stands were larger than 10 m^2, and in different ruderal areas, most often along the rivers Vrbas, Vrbanja and Crkvena. The aim of the work was to map the stands of *R. japonica* in the urban part of Banja Luka in order to ensure the monitoring of this species and the control of its spread.

MATERIALS AND METHODS

The research was conducted in the urban green areas of the city of Banja Luka during the vegetation period of 2021 and 2022. The research included parks, gardens, courtyards, green areas along roads, construction sites, parts of the banks of the Vrbas and Crkvena rivers. Certain difficulties that appeared in the research work related to inaccessible places such as private yards where entry was prevented and fenced areas where construction work was being carried out. All stands of *R. japonica* were mapped and classified into size classes (0-10 m^2, 10-50 m^2 and >50 m^2).

RESULTS AND DISCUSSION

Analysis of the distribution of *R. japonica* recorded a total of 103 stands of *R. japonica* in the urban area of the city of Banja Luka (Table 1). The representation of stands is correlated with the type of habitat and anthropogenic factors that are implemented in the city to varying extents. Most of them were found in the city center, more precisely in the local communities of Obilićevo and Center, than in Borik 2, and the smallest number of stands was established in the local community of Nova varoš. The large presence in Obilićevo, Center and Borik is related to the fact that part of the banks of the Vrbas and Crkvena rivers belong to the mentioned settlements, and these are precisely the places where monodominant stands of *R.japonica* were recorded (Figure 1). Similar results were found when studying the distribution of this plant in the area of the city of Sarajevo, where the species was often recorded on the banks of the Miljacka (Sarajlić *et al*., 2016). On the other hand, the settlement of Nova varoš has no unkempt green areas and large infrastructural activities (construction of roads and the like), which significantly reduces the possibilities of the spread of this species.

Table 1. Overview of the number and size of *R. japonica* stands in Banja Luka in 2021

Local communities	**0-10 m^2**	**10-50 m^2**	**>50 m^2**	**Total**
Obilićevo	14	4		18
Starčevica	3	1		4
Borik 1	6			6
Borik 2	4	3	3	10
Rosulje	6			6
Nova Varoš	3			3
Centar	4	6	2	12
Bulevar	8	2	1	11
Kočićev vijenac	3	3	3	9
Lazarevo	1	2	3	6
Lauš	2	3		5
Ada	1	1	3	5
Srpske Toplice	7		1	8
Total	**62**	**26**	**16**	**103**

In the local communities of Obilićevo and Centar, the largest stands were recorded along the banks of the rivers. Also, in a large number of cases, the plant was found in disturbed places, construction sites and along roads. That the plant is common next to roads is shown by the research of Hlavati-Širka (2018), who found the plant in 21 localities in the wider area of Banja Luka right next to the main road. In the local community of Centar, a large stand is present in Vidovdanska Street with an unorganized parking space. In the settlement of Kočićev vijenac and Srpske Toplice, the largest stands were recorded along from the Zmijanja Rajka Street on the Vrbas coast and along western transit and Omladinska Street. It is precisely in the settlement of Kočićev vijenac, at the intersection of Radoja Domanović Street and western transit (Omladinska Street), that the largest stand was recorded, the area of which exceeds more than 100 m^2. It is a neglected green area with a large slope that has been left to spontaneous growth. In the Borik 2 neighborhood, in Miše Stupara Street, larger stands were recorded next to residential buildings and the fence of the water park „Aquana" where it forms a living wall. In the local community of Nova varoš, the Japanese knotweed was recorded only in a few localities and that along the fences of private yards. The small number of registered units and stands in this local community is probably related to the good maintenance of green areas around public buildings. A similar situation exists in the local community of Starčevica.

Figure 1. Map of recorded stands of *R. japonica* species in the research area (*Google Earth*, modified by Lubarda, B., 2022)

In general, it was noticed that the stands are larger and more developed on flat to slightly sloping terrains. In several locations in the city, such as on the green areas in the Olimpijskih pobjednika street, the plant is intensively mowed, but it regenerates very quickly. During the research, it was noticed that some stands reduced their area or disappeared completely, but they were present during the research in 2004 and 2013 (Koračak, 2013; Topalić-Trivunović and Šumatić, 2004). The reasons for the decrease in the area of this species are related exclusively to the construction of residential buildings and the complete destruction of green areas.

CONCLUSION

R. japonica is a plant that was once highly valued for its aesthetic, medicinal and practical qualities, but has now become an indestructible threat to biodiversity. In order to develop effective measures for the eradication of this invasive plant, it is necessary to carry out more detailed research on predicting the distribution as well as testing the germination of plant seeds.

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