INVASIVE PLANT SPECIES OF THE WIDE AREA OF THE TOWN OF LUKAVAC AS A THREAT TO BIODIVERSITY

ABSTRACT

Invasive plant species are foreign species that usually have a negative impact to the native flora and vegetation, human health, or that cause damage to agriculture and the economy. Therefore, the spread of invasive species is one of the biggest problems in nature protection. The aim of the work is to determine the invasive plant species in the wider area of the city of Lukavac, to analyze the life forms and the geographical origin. The research was done during the summer months of 2021. This paper presents the results of research on invasive plant species in the wider area of the town of Lukavac, which is located in the northeastern part of Bosnia and Herzegovina and administratively belongs to the Federation of Bosnia and Herzegovina and the Tuzla Canton. Total 12 invasive species from 8 families and 12 genera were recorded. The largest number of species belongs to the Asteraceae family, while the other families are represented by one species. Among life forms, therophytes (58, 33%) and phanerophytes (25%) dominate. Geophytes and hemicryptophytes are represented by only one plant species. Recorded invasive plant species come from North America (75%) and Asia (25%).

Keywords: invasive species, Lukavac, biodiversity

1. INTRODUCTION

Invasive plant species that come from other biogeographic areas, and in the process competition suppresses autochthonous flora, penetrating into available ecological niches (Richardson and Pyšek, 2006). According to the time when they were introduced to Europe, they can be classified as archaeophytes (which were introduced before 1500) and neophytes (which were introduced after 1500) (Preston et al., 2004; La Sorte et al., 2007).

In addition to the impact on biological diversity, invasive plant species can often have a negative impact on economy, and even human health (Kowarik, 2003). Study of the flora of

urban environments and their invasive species has intensified recently because of specific plant species species that have adapted to high human population density, so that urban flora can be richer than one in the surrounding areas (Pyšek, 1988). Invasive species are often reported to have increased competitiveness compared to autochthonous species (Bakker and Wilson 2001, Brewer and Cralle 2003), and lack of natural enemies (Davis et al. 2000). Habitat degradation and direct human influence plays a major role in this (Jackowiak, 2011), therefore urban areas are one of the centers where non-native species can easily develop into invasive ones (Elvisto et al. 2016).

Numerous literature data are related to the monitoring and control of invasive plant species (Ruščić, 2002; Betheny et al., 2010; Vila et al., 2010, Lososova et al., 2012; Boskailo et al., 2017; Zima and Stefanić, 2021). Invasive species are a separate group of alochthonous plants, characterized by high adaptability to new habitats, rapid colonization of habitats with a large number of descendants, with passive or often active mechanisms of displacing autochthonous species from the habitat. With this they change the structure and composition of plant communities, and reduce the total richness of species. They consider the biggest threat to biodiversity, global and local economy and functions of the ecosystem (Mack et al., 2000; Wardle et al., 2011).

Lukavac is a small town located in the northeastern part of Bosnia and Herzegovina. Administratively it belongs to the Federation of Bosnia and Herzegovina and Tuzla Canton (Figure 1). It is located in the valley of the river Spreča. The average altitude is 186 meters, and the area of the town is 320 km^2.

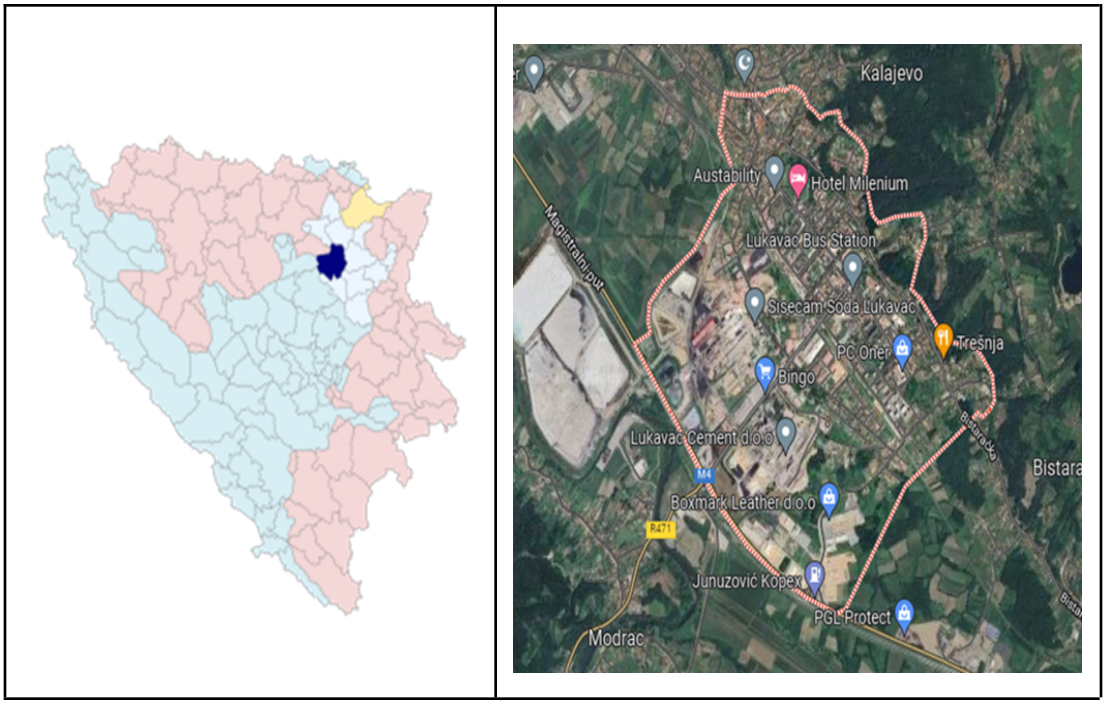


Figure 1. Geographical location of the researched area (source: Google maps application)

This area has a moderately continental climate which is characterized by warm wet summers and harsh winters with stronger penetrations of the Mediterranean climate in the period of June – August. The climate of this area is significantly influenced by the Pannonian Plain in the north and the Dinaric Mountain massif in the south. In the winter period, the Siberian anticyclone has the greatest significance, when this area is exposed to penetration of cold and dry air masses from the north and northeast. In a warmer period of the year, the Azores anticyclone has a dominant influence when, due to elevated air pressure stable weather remains for a longer period in this area (Spahić, 2002).

Data about the flora of this area is very scarce.

The aim of the work is to determine invasive plant species in the wider area of the city of Lukavac, to make an analysis of life forms of recorded invasive plants, and geographical origin. The results of research should provide a basis for developing a strategy for monitoring the situation and planning measures for suppression of unwanted plant species in order to protect
the autochthonous flora.

2. MATERIAL AND METHODS

Field research was doneduring the summer months of 2021, in the period when most invasive species are in the optimal stage of development, both for observation in the field and for determination. Field research included: site selection, collection of plant materials and photo documentation in the field.

For species determination, standard keys and iconographies were used: Trinajstić (1975-1986), Pignatti (1982), Tutin et al. (1964-1980, 1993) Jávorka and Csapody (1991) and Domac (1994), and the nomenclature is done according to Nikolić et al., (1994, 1997, 2000). The list of invasive plant species is presented alphabetically by family. Analysis of life forms was determined according to Pignatta (2002) using the following abbreviations: Ph – Phanerophyta, H – (Hemicryptophyta), G – Geophyta, T – Therophyta, Hy – Hydrophyta.
The geographical origin of the invasive flora is stated according to Boršić et al. (2008) and in doing so the following abbreviations are used: Am-N (North America), As (Asia), As-E (East Asia).

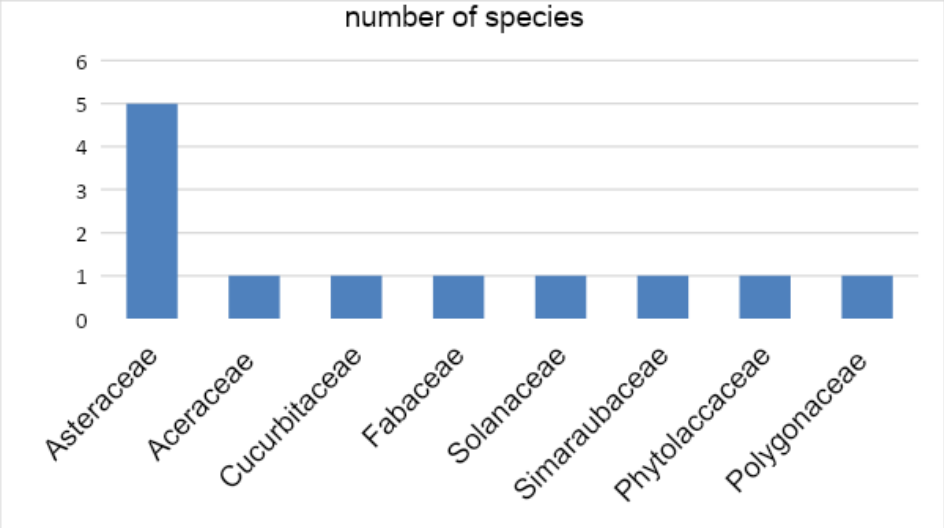
3. RESULTS AND DISCUSSION

During field research, 12 invasive plants were registered in the researched area
species from 8 families and 12 genera (table 1).

Table 1. Overview of invasive plant species in the wider area of the city of Lukavac

Latin name	Family	Origin	Life form
Ailanthus altissima (Mill.) Swingle	Simaroubaceae	As-E	Ph
Acer negundo L.	Aceraceae	Am	Ph
Ambrosia artemisifolia L.	Asteraceae	Am-N	T
Artemisia verlotiorum Lamotte	Asteraceae	As	T
Datura stramonium L.	Solanaceae	Am-N	T
Echinocystis lobata (Michx.) Torr. & A. Gray	Cucurbitaceae	Am-N	T
Erigeron annuus L. Desf.	Asteraceae	Am-N	T
Helianthus tuberosus L.	Asteraceac	Am-N	G
Phytolacca americana L.	Phytolaccaceae	Am-N	H
Reynoutria japonica Houtt.	Polygonaceae	As	T
Robinia pseudoacacia L.	Fabaceae	Am-N	Ph
Solidago gigantea Aiton, Hort. Kew.	Asteraceae	Am-N	T

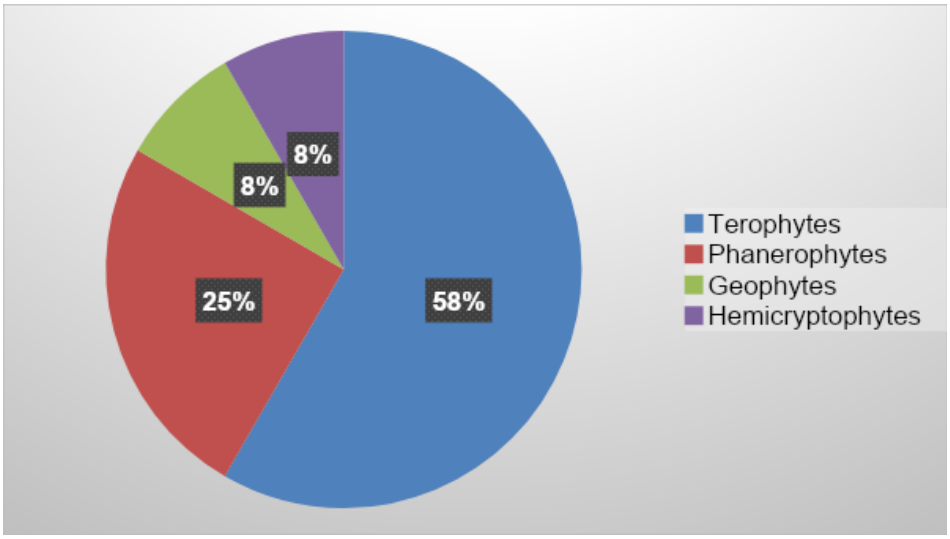
Graph 1. Representation of families among invasive species in the wider area of the town of Lukavac



The largest number of determined plant species belongs to the Asteraceae family (5 species; 41,6%), while the other families are represented by only one plant species (graph 1). The Asteraceae family is also dominant in the foreign flora of Zagreb (Hudina et al., 2012), Sisak (Pruša et al., 2013), Podgorica (Stešević et al., 2014), Mostar (Maslo, 2015) and Stolac (Boškailo et al., 2017).

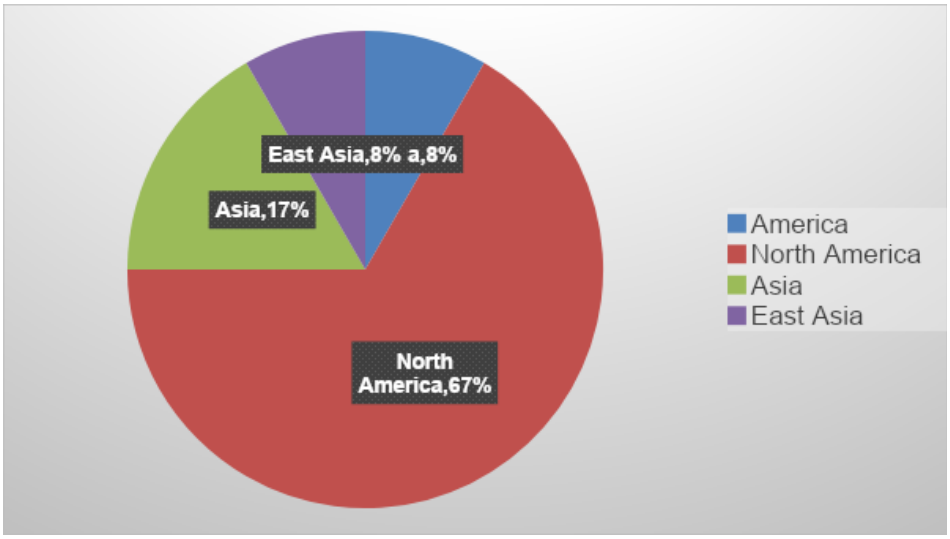
Among the life forms, therophytes (7 species; 58.33%) and phanerophytes (3 species; 25%) are dominant. Geophytes and hemicryptophytes are represented by only one plant species, i.e. the share of 8.33%. (graph 2). A group of researchers (Pyšek et al., 2002; Boršić et al. 2008; Marini et al. 2012; Boškailo et al., 2017; Zima and Štefanić, 2021) also emphasize the dominance of therophytes in the analysis of invasive flora.

Graph 2. Spectrum of life forms of invasive flora in the wider area of Lukavac



According to the origin of the invasive plant species in the wider area of Lukavac, they come from the area of America, mainly North America (9 species; 75%) and Asia (3 species; 25%) (graph 3). Boršić et al., (2008) state that the percentage of invasive plants introduced from the American territory is 71.9%. However, this is expected due to the similarity of climate characteristics between Europe and the North America (Zima and Štefanić, 2021). Analysis of the geographical origin of the flora of Sarajevo (Sarajlić i Jogan, 2017), Podgorica (Stešević et al., 2014) and Mostar (Maslo, 2015), showed that the most plants originate from North America and Asia.

Graph 3. Origin of invasive species in the researched area



The spread of invasive species in the research area can be expected primarily on areas and habitats that are under greater anthropogenic influence, such as: settlements, then along the edges of roads and paths, arable land, etc. For now, none of the recorded invasive species within the research area was recorded on larger areas and with the high population density.

4. Conclusion

Based on the results of the research, the following conclusions were reached:

- 12 invasive plant species from 8 families were determined in the investigated localities and 12 genera. The largest number of species belongs to the Asteraceae family (41, 6%), while the rest families represented by one plant species.

- Among life forms, therophytes (7 species; 58,33%) and phanerophytes (3 species; 25%) dominate. Geophytes and hemicryptophytes are represented by only one plant species, ie with a share of 8.33%.
- According to the origin of the invasive plant species in the Lukavac area, they come from the area of North America (9 species; 75%) and Asia (3 species; 25%).

Careful and responsible management of the natural resource will allow the number of invasive plants to decrease species maintain at the existing level. High rate of biotic homogenization in urban areas points to the need to conserve biodiversity, even in habitats that are strongly transformed by human.

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