PLANT COMMUNITIES DISTURBED BY INVASIVE SPECIES ON THE PĂPĂDIA ISLAND IN THE DANUBE BASIN

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Abstract

The territory under study is is represented by Papadia Island in the Danube Basin. This island located near the town of Dăbuleni is characterized by a very rich flora and fauna and an extremely valuable biodiversity from a conservation point of view.

Invasive species have a negative impact on forest, grassland, and agricultural ecosystems around the world, sometimes associating and forming segetal or ruderal plant communities. Exotic species compete with native species and threaten ecosystem stability.

The studies on alien species are of particular interest today to protect natural habitats and reduce or eliminate ecological and economic damage. Invasive species are one of the most serious threats to biodiversity.

The paper presents the results obtained from the studies carried out regarding the plant communities whose structure is disturbed by the increase in the number of invasive species, as well as their density on the Păpădia Island in the Danube basin. In this region, the intensive abiotic activity, but not only that, has brought about the invasion of allochtone (invasive alien) species plants in the natural and semi-natural degraded ecosystems, especially in alluvial forest habitats. The species has been found in the following în mai multe types de comunități vegetale.

Key words: *Păpădia Island, Oltenia, invasive species, forest plant communities, ecology, phytosociology*

INTRODUCTION

The invasive species influence the succesional dynamics and the floristic composition of the plant communities, occupying increasingly more and more space. Biological invasion of the invasive plants is considered to be one of the most serious threats to biodiversity in alluvial and meadow vegetation. Invasive species have a very high power of adaptation outside their natural distribution areas and the presence of very widespread dispersal potential, in new areas they have the ability to invade and dominate or overwhelm specific natives. These species influence biological diversity in ecosystems or natural or semi-natural habitats, representing an important factor in the change and dynamics of native biodiversity (Niculescu et all., 2022)

In the recent past, the rate and risk associated with alien species introductions have increased enormously because human population growth and human activities altering the environment have escalated rapidly (Pimentel et al., 2000).

The impact of invasive species is felt at the level of all ecosystems, where their stability can cause habitat destruction, species extinction, and global functional or biological alterations.

Effective management of the spread and control of these organisms - whether plant or animal - requires complex research. This must address aspects related to the ecology, morphology, anatomy, phenology, reproductive biology,

physiology, phytochemistry, phytosociology of the respective populations.

Studies in recent years highlight the severe negative impact of invasive organisms on various environments (aquatic, forest, grasslands and more), but also the risks they pose to the health of the population.

The paper presents a preliminary study on the species of invasive plants encountered in the summer of 2023 on Păpădia Island, an integral part of the Danube area, under protection.

This island located in the Danube Valley, in the southern part of Romania, is of particular importance from the point of view of natural capital.

The specific flora and fauna biodiversity of this island, located in the Danube River basin, is supported by a succession of varied habitats, including both aquatic areas and forests.

The specific eco-pedo-climatic conditions compensate for the limited surface area of the island, allowing the prosperity of a special vegetation, with numerous botanical rarities. The faunal segment is equally valuable, being marked by the presence of rare bird species and a distinct core of habitats of community and priority interest.

Extremely varied habitats, from aquatic environments to forest ecosystems, coexist on Păpădia Island, a territory located on the Danube in the vicinity of the Olt estuary and recognized for its remarkable biological diversity. Although its dimensions are limited, the characteristics of the soil and the local climate stimulate a very special vegetation, rich in floristic rarities.

Equally, this isolated space protects vulnerable bird species, transforming the island into a site with particularly valuable biological structures and ecosystems.

Geographically, although the island is right next to the town of Dăbuleni (Dolj), it is much closer to the area where the Olt River flows into the Danube (the Corabia - Islaz site).

Extremely varied vegetation, from aquatic environments to forest ecosystems, coexists on Păpădia Island, a territory located on the Danube near the Olt and Jiu rivers mouth and recognized for its remarkable biological diversity.

MATERIALS AND METHODS

Păpădia Island: It is located further upstream on the Danube, next to the town of Dăbuleni (Dolj County), being geographically positioned closer to the sector between the confluence of the Jiu and the confluence of the Olt with the Danube.

The list of the invasive plant species from Păpădia Island, deliberately introduced in several ways, is based on a great lot of bibliographic sources, numerous herbarium data (Craiova), and the field observations of the author in the 2023 year.

In the appreciation of the species invasive status we took in consideration their chorology in Copănița Island, the occupied habitats and their capacity of reproduction and formation of stable populations, without the human intervention.

We have utilized the nomenclature after Tutin et al. (eds.) 1964-1980; Ciocârlan 2000, Sîrbu, 2004, Sîrbu & Oprea, 2011 and official invasive species lists.

For taxonomical identification we have utilized also the botanical literature, notably Romanian Flora (1952–1976), by Săvulescu et all.

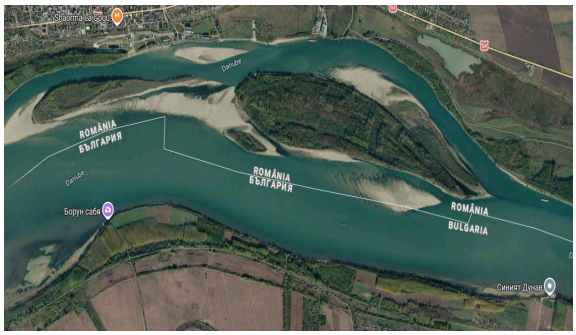


Figure 1. Păpădia Island
(source: https://www.google.ro/maps)

RESULTS AND DISCUSSIONS

The research conducted in the Danube Valley, on Păpădia Island, aimed to evaluate the effects of invasive non-native flora on the configuration and dynamics of plant communities in floodplains and meadows. In order to effectively manage the ecological risks and anthropogenic pressure associated with these species, it becomes imperative to define strict measures for the control and protection of riparian biotopes.

The floristic inventory in the studied area highlighted the presence of 27 invasive exotic species, the study bringing valuable contributions by identifying new sites for their reporting in Oltenia and in Romania.

Ecological assessments regarding the inventory and conservation status of habitats of community interest (Natura 2000) on Păpădia Island have highlighted the presence of a significant number of invasive plant taxa. The penetration of these alien plants was carried out in stages, the main vector of dispersion being hydrographic, favored by the intense naval traffic on this sector of the Danube, to which other secondary routes were added. A turning point in their uncontrolled proliferation and territorial expansion was represented by major climate changes, to which are added even periods of flooding such as the one in 2006, which was very strong and brought numerous invasive species.

Due to their high ecological plasticity and superior competitive capacity compared to the native flora, some of these species have colonized extensive areas, successfully infiltrating various biotopes: from freshwater aquatic and mesophilic or hygrophilic meadows, to scrublands and forest ecosystems.

Analysis of the current distribution, population dynamics and degree of habitat damage confirms the invasive nature of the 27 identified species. They have the ability to reproduce autonomously, without human support, expanding their range both within anthropized biotopes and within natural or semi-natural ones.

Among the species identified with well-individualized populations and a very high degree of expansion, we can mention: *Ailanthus altissima* (Mill.) Swingle, *Ambrosia artemisiifolia* L. (*A. elatior* L.), *Amorpha fruticosa* L., *Chenopodium ambosioides* L., *Conyza canadensis* (L.) Cronq. (*Erigeron canadensis* L.), C. sumatremsis Retz., *Echinocloa colona* (L.) Link., *Echinocystis lobata* (Michx.) Torr. et A. Gray, *Eclipta prostrata* (L.) L. (*E. alba* (L.) Hassk., *Erigeron annuus* (L.) Pers. (*Aster annuus* L., *Stenactis annuua* (L.) Ness.)., *Kochia scoparia* (L.) Shrad. (*Bassia scoparia* (L.) A. J. Scott., *Chenopodium scoparia* L.), *Oenothera glazioviana* Micheli (*O. erythtosepala* Borbás; *O. lamarkiana* auct. non., Ser.), *Panicum capillare* L., *Panicum miliaceum* L et al. 2005), *Phytolacca americana* L. (*Ph. decandra* L.), *Sicyos angulatus* L.), *Symphyotrichum lanceolatum* Willd. (*Aster lanceolatum* (Willd.) G. L. Nesom), *Xanthium orientale* L. ssp. *italicum (Moretti) Greuter, Echinocystis loba*ta (Michx.) Torr. & A.Gray, *Bidens frondosa* L., *Helianthus tuberosus* L., *Parthenocissus inserta* (A.Kern.) Fritsch, *Abutilon theophrasti* Medik., *Cenchrus spinifex* Cav., *Elodea nuttallii* (Planch.) H. St. John, *Azolla filiculoides* Lam., *Lycium barbarum* L., *Conyza bonariensis* (L.) Cronquist, *Symphyotrichum ciliatum* (Ledeb.) G.L.Nesom, *Veronica persica* Poir.

Of these, a few species have a spectacular evolution in terms of invasiveness and have formed populations that occupy extremely large areas.

***Cyperus diformis* L.** is one of the species frequently found on the island and which has developed very well in terms of population and morphology in recent years.

Eclipta prostrata (L.) L. (*E. alba* (L.) Hassk.) spread on Păpădia Island: forest and herbaceous habitats; first mention in Romania: 1994-1996, Sîrbu A., from The

Small Island of Brăila, Brăila County (Sîrbu and Oprea, 2011; Niculescu, 2022).

Panicum miliaceum L. spread on Păpădia Island: herbaceous habitats; first mention in România cultivated species from the Neolithic period.

Sicyos angulatus L.: spread on Păpădia Island: forest habitas; first mention in Romania: 1816, Baumgarten, Transilvania (Sîrbu and Oprea, 2011).

Symphyotrichum lanceolatum Willd. (*Aster lanceolatum* (Willd.) G. L. Nesom) spread on Copănița Island: herbaceou, schrub, aluvial forest habitats; first mention in Romania: Soó, 1940, Transilvania (Borza, 1947).

The stability and conservation of natural heritage are deeply affected by species intentionally introduced for decorative purposes, which have the potential to eliminate indigenous flora and alter the functional balance of ecosystems.

This phenomenon is amplified by the uncontrolled numerical expansion of individuals and the increase in the invasion capacity of these populations, processes directly stimulated by global climate mutations in recent years. As a result, biological diversity in a wide range of habitats is undergoing major structural changes.

CONCLUSIONS

Early identification of critical areas where monitoring and prevention efforts should be focused optimizes the management costs of the 27 invasive species identified in the study area.

Among them are *Conyza bonariensis, C. canadensis, C. sumatremsis, Symphyotrichum ciliatum, Chenopodium ambosioides, Echinocloa colona, Echinocystis lobata Cyperus diformis, Eclipta prostrate, Ailanthus altissima, Ambrosia artemisiifolia, Amorpha fruticosa, Sicyos angulatus and Elodea nuttallii* showed a great interest in our studies on Păpădia Island, noting population characteristics, invasive aggressiveness and special migration in the context of current climate changes, corroborated with the prolonged drought of recent years

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The present study constitutes a preliminary stage, with future research following the ecological succession determined by the pedoclimatic conditions and the geographical isolation of the island. Since the investigated area is an integral part of a national protected area, the continuous monitoring of these non-native populations becomes a priority. The results can serve as a useful working tool in substantiating policies for controlling biological invasions in Romania, protecting plant communities and vulnerable habitats in the face of these intense ecological pressures.

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