

**Study of *Impatiens glandulifera* competitors among
native plant species and their potential for control of the soil erosion in
riparian habitats**

**Dr. Plamen Glogov,
Dr. Mira L. Georgieva**

Forest Research Institute, Bulgarian Academy of Sciences



Hymalayan balsam
(*Impatiens glandulifera* Royale)

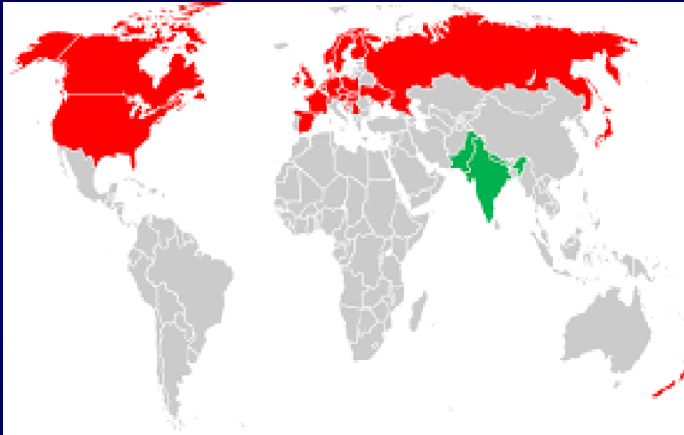
One of the most dangerous Invasive alien plants causing:
habitat degradation and biodiversity loss

Strategy: Fast growth. Dense communities. Strong vegetative and seed propagation Uses water for transmission.

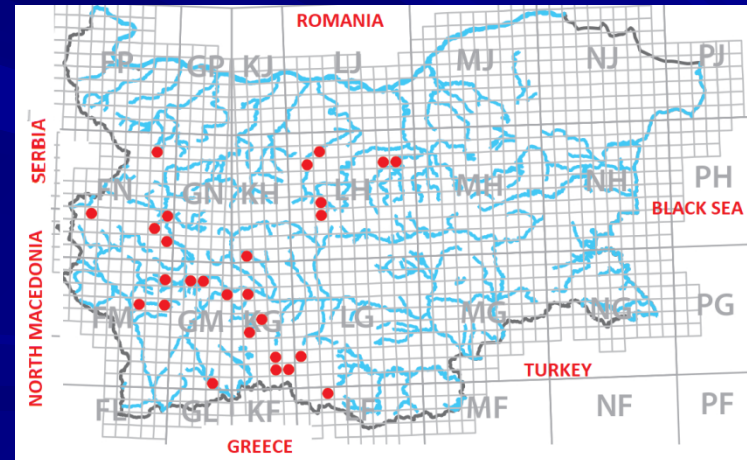


Distribution of Hymalayan Balsam

World distribution



Distribution in Bulgaria

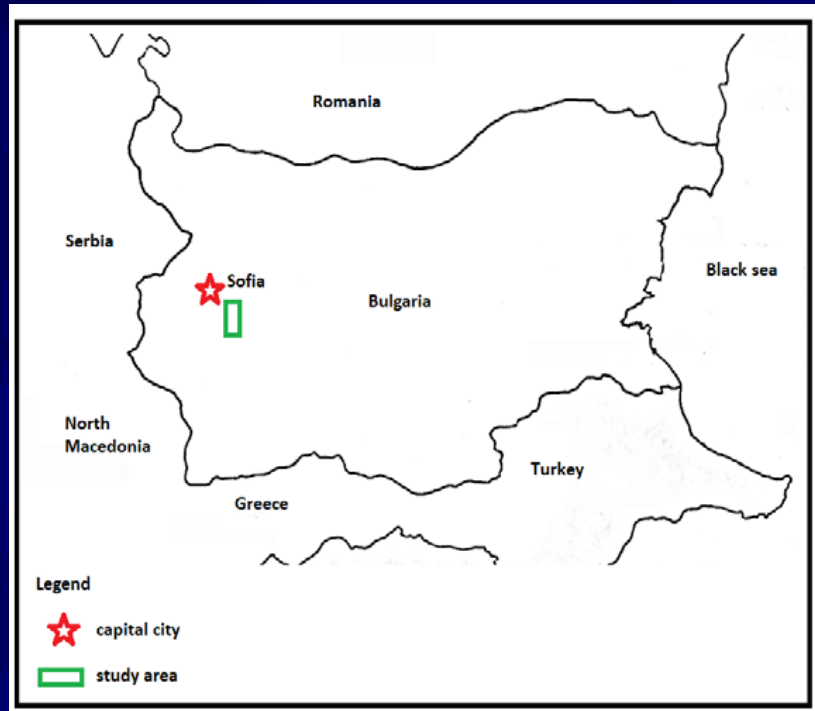


The aim of the study

The aim of the present study is to identify among the native plants the main competitors of *Impatiens glandulifera* in an experimental section of the Iskar River gorge with intensive presence of this invasive alien plant and to identify among these species those whose populations would help limit its distribution in natural hygrophilous communities and to reduce the risk of soil erosion in the riparian zone.



Materials and methods



The study area is located 10 km from the capital of Bulgaria- Sofia.

The investigation was conducted in the period 2019-2020.

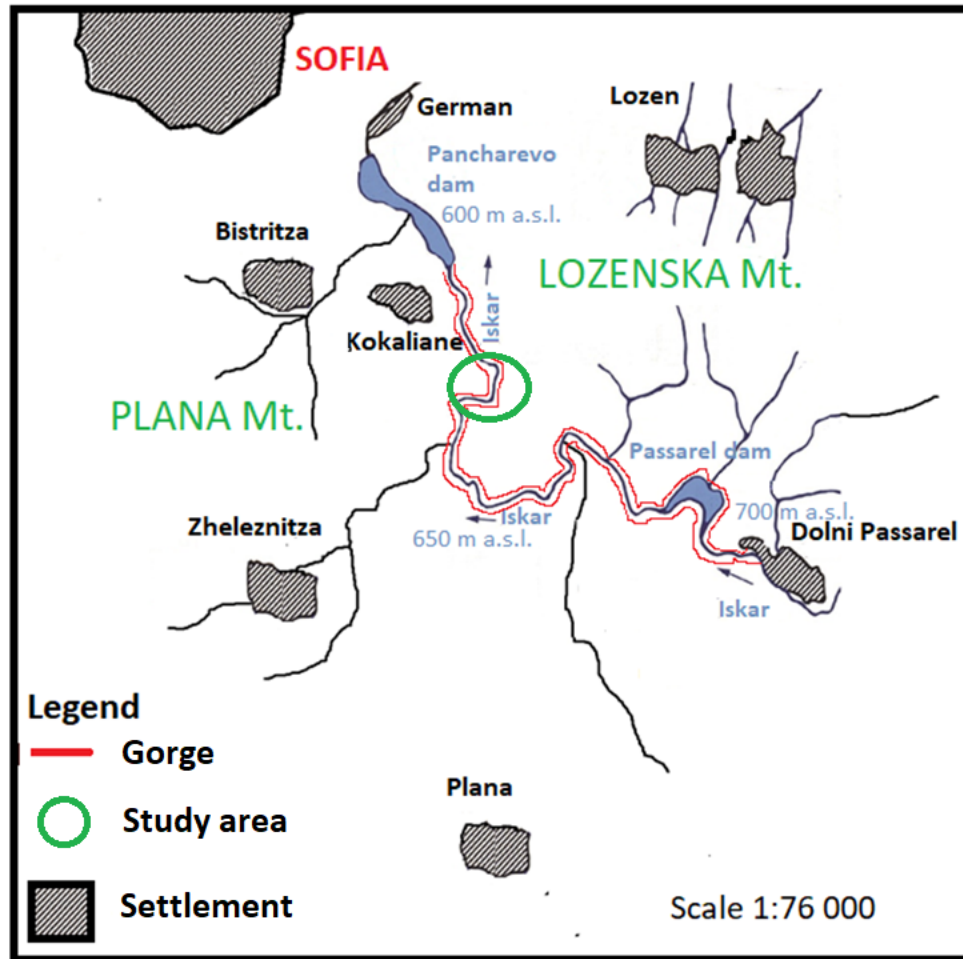
Parameters of the area:
Iskar River Gorge (Western Bulgaria)
650 m. a.s.l.; 3 sq. km,

Average monthly air humidity is the lowest in July (63%) and the highest in December and January (85%).

Monthly temperature is the highest in July, 21.5 °C and the lowest in January, - 2.5 °C.

The average annual precipitation is 645 mm.

Materials and methods



Sixty Permanent Sample Plots (area 2x2 sq. m.) were set up in representative wetland communities

Measurements:

- Floristic composition
- Cover abundance (Braun-Blanquet scale);
- Density of populations (number of individuals per sq. m.
- Measurement of the predominant height of the species
- Phenological observations

Floristic measurments

Results

During the investigation period 12 dominant species were identified in the communities represented by the PSP, including 1 annual (*Impatiens glandulifera*), 10 perennials and 1 shrub (*Rubus caesius*)



Impatiens glandulifera



Rubus caesius



Aegopodium podagraria



Urtica dioica



Petasites hybridus



Scrophularia umbrosa



Typha angustifolia



Epilobium hirsutum



Scirpus sylvaticus



Carex sp.,



Phalaris arundinacea



Phragmites australis

Results

Species cover abundance measurment

Among the native species with the highest share in PSP are European dewberry (*Rubus caesius*), *stinging nettle* (*Urtica dioica*) and *goutweed* (*Aegopodium podagraria*), which, like the invasive alien species *Impatiens glandulifera*, are found in over 50% of PSP. European dewberry and stinging nettle are the predominant species in more than 1/3 of all PSP.

The Himalayan balsam was not found in the monodominant communities of the Poaceae reresentatives *Phalaris arundinacea* and common reed *Phragmites australis*, and in the communities of sedges (*Carex sp.*), wood clubrush (*Scirpus sylvaticus*) and lesser bulrush (*Typha angustifolia*) individuals with low cover abundance or single ones have been identified.



Rubus caesius



Urtica dioica



Aegopodium podagraria



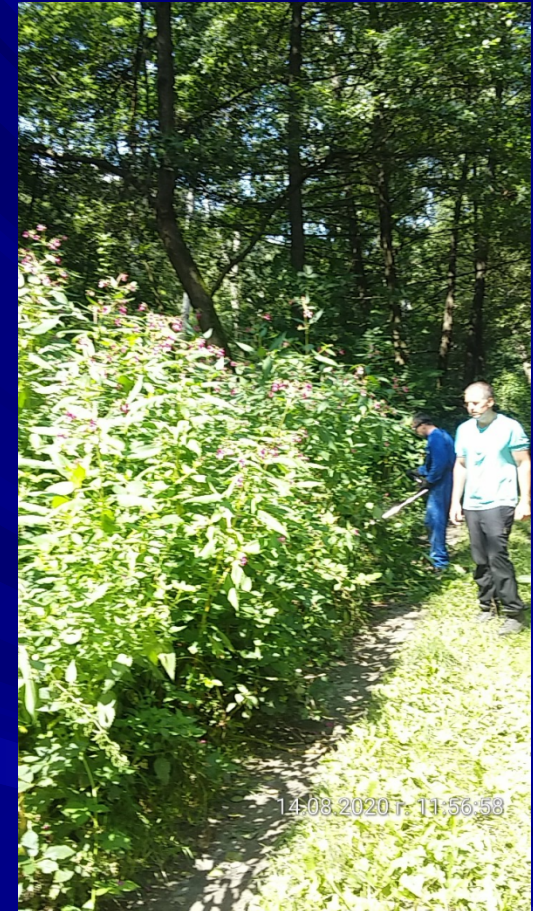
Impatiens glandulifera

Results

Density of the populations

The average number of individuals in the populations of the most common dominants decreased from the juvenile phase to the maturity phase between 1.4 times and 3.2 times in the monodominant communities and between 1.3 times and 5.6 times in the polydominant communities

In the monodominant communities the population density decreased the least in *Aegopodium podagraria* (1.4 times) and *Petasites hybridus* (1.6 times), and in the polydominant communities in *Epilobium hirsutum* (1.3 times) and *Petasites hybridus* (2.2 times).



*Removal of Impatiens glandulifera
monodominant community*

Results

Phenological observations

Most of the dominants which number prevails in the PSP have a long growing season between 9 and 11 months, and for some of them it starts from the beginning of the calendar year.

The growing season for Hymalayan balsam starts a month later in comparison with the native species. The species with the longest flowering period- 4 months are *Impatiens glandulifera* and *Urtica dioica*.

The flowering period in most native species begins earlier than that of the Hymalayan balsam.



Early spring flowers: Chrysosplenium alternifolium, Anemone ranunculoides

Results

Measurement of the predominant height of the species

Among the more common dominants ocured in PSP, with the highest average predominant height of juvenile plants is *Scrophularia umbrosa*, and the species with the lowest ones- *Petasites hybridus*.



Among mature individuals the highest are the stems of *Impatiens glandulifera* and *Urtica dioica*, and the lowest -those of *Petasites hybridus*.

A comparison between the heights of the species in juvenile phase in the monodominant and polydominant communities shows that in the former the individuals are taller.



Conclusions

In the study area, the most suitable of the native plants against the Himalayan balsam are *Phalaris arundinacea* - for localities of flooded and periodically flooded type and *Phragmites australis* - for standing waters.

In riparian communities with a three- and four layers structure and high total cover abundance of the tree layer, the shade-tolerant species *Aegopodium podagraria* is the most competitive with *Impatiens glandulifera* and permanently suppresses its populations.

The recommendation for optimal use of local competitors is to stimulate their spread in areas not occupied by vegetation along the river under the direct action of the watercourse in order to strengthen the shore and subsequently planting local tree and shrub species (alder, willow and poplar) to build a sustainable vertical

