INVASIVE PLANTS OF THE BELARUSIAN-LITHUANIAN BORDER

O. V. Sozinov[a], V. A. Sipach[b]
[a] Yanka Kupala Grodno State University, 22 E. Ozheshko Str., 230023, Grodno, Belarus
[b] Scientific and Engineering Republican Unitary Enterprise "Geoinformation systems", 6 Surganova Str., 220012, Minsk, Belarus
Corresponding author: O. V. Sozinov (*o.sozinov@grsu.by*)

Introduction. During implementation of the project "Reduction of Negative Impact of Alien Invasive Plant Species on Ecosystems and Human Wellbeing in Cross-border Region of Lithuania-Belarus" ENI-LLB-1-207 an inventory of 8 target invasive plant species (*Acer negundo*, *Asclepias syriaca*, *Echinocystis lobata*, *Heracleum sosnowskyi*, *Heracleum mantegazzianum*, *Impatiens grandulifera*, *Solidago canadensis*, *Solidago gigantean)* and their mapping in the Belarusian-Lithuanian border area were carried out.

Materials and methods. Field studies covered an area of 1,555 km^2: part of Grodno and Shchuchin districts, including the republican landscape reserves "Kotra", "Oziory" and the right bank of the reserve "Grodnenskaya Pushcha". In the field work, we used space images with objects applied to them, with the help of which the growing areas of target alien invasive plant species (AIPS) were determined. The fieldwork was based on a grid method (2.4 km by 3.4 km rectangles (n = 241)). Sample: 518 questionnaires were filled in, 634 species records were drawn up (this indicator is more than the number of questionnaires due to the presence of several target species in some of the questionnaires), information on 658 habitats of the target species was entered (234 points, 140 lines, 284 areas). The research did not cover the territory of Gozha military training ground. Field surveys were carried out in each rectangle. For each alien invasive plant species (AIPS) found, a special form (questionnaire) was drawn up, with indication of the location, habitat and other necessary information. On the printed map, the location of the invasive plant species was marked with a marker, indicating the type of cartographic unit: point, line (tape) or area. All completed forms and maps were scanned and then entered in the database. A special application for smartphones has been developed and implemented into practice, which allowed mapping and entering descriptions of the populations. It automatically records location coordinates and saves a photographic image of the spicies found. Implementation: the cartographic and analytical part of the work was implemented on the geoinformation platform ArcGIS.

Results. Collected field data are combined into a single geographic database, which enables to store and manage both spatial (points, lines and polygons) data and attribute data. The digital map served as the basis for an interactive web application that was developed within the framework of the project, and is available to all interested organizations and citizens for further adding of the information about the places where alien plant species grow and about the measures taken to combat them (https://bit.ly/2S1UxLa).

During inventory of the project area (Belarusian part), from the target list (8 plant species) 6 species revealed: *Acer negundo*, *Echinocystis lobata*, *Heracleum sosnowskyi*, *Impatiens grandulifera*, *Solidago canadensis*, *S. gigantea*. The total area occupied by the target species is less than 1 % of the project area. The areas of *Asclepias syriaca* and *Heracleum mantegazzianum* growth were not identified.

The distribution of the identified species (according to the mapping results) reflects the main patterns of the secondary AIPS habitat formation: the habitats and their greatest concentration falls on settlements and their environs, as well as on highways (road and rail transport). In general, the largest number of habitats within the project area (Belarusian segment) was identified in southern part of the project area which is most economically developed. A direct relationship between the total area occupied by a species and the number of localities was noted, which makes it possible to rank the identified species according to these two indicators. The largest area with the largest number of localities among the target species is occupied by

Acer negundo (~ 43 % of the total area occupied by the target species). *Solidago canadensis* also belongs to the group with the largest occupied area and number of habitats. The group of the target species with an average proportion of occupied area includes *Solidago gigantea* and *Echinocystis lobata*: more than 100 and less than 250 ha. The group with the smallest occupied area includes *Heracleum sosnowskyi* and *Impatiens grandulifera.* The minimal presence of *Heracleum sosnowskyi* is the evidence of effectiveness of the government measures to eliminate this aggressive species.

The study showed, that among alien goldenrods (*Solidago canadensis*, *S. gigantea*), the most dangerous is *Solidago gigantea*, as it completely displaces all other plant species in places of its growth.

Only four species (*Acer negundo*, *Heracleum sosnowskyi*, *Solidago canadensis*, *Solidago gigantean)* occupy habitats with signs of aggressive species destruction. The territories, where measures are being taken to eradicate this aggressive plant species, occupy only 3 % of their total habitats. This is not sufficient for effective biosafety work.

The accompanying AIPS are most often found with *Acer negundo* and *Solidago canadensis* (~ 60–80 habitats, more than 200 ha). The species commonly associated with AIPS and often characterized by high abundance are *Erigeron annuus*, *Rosa rugosa*, *Robinia pseudoacacia*, and *Impatiens parviflora*.

Conclusion. *Acer negundo* and *Echinocystis lobata* are the most dangerous species for ecosystems and economics in the project area. It is predicted, that invasive species areas and number of its habitats will expand, in particular those that are not subject to systematic control and struggle: *Acer negundo*, *Echinocystis lobata*, *Solidago gigantea*, as well as accompanying AIPS (*Bidens frondosa*, *Erigeron annuus*, *Robinia pseudoacacia*, etc.).

The high level of natural habitat, as well as intensive agriculture and forestry, reduce the risks of AIPS invasion.

The created GIS provides the authorities and reserves administrations with up-to-date information for taking reasonable actions to prevent further spread of invasive plants.