

## SPREAD SPECIES AILANTHUS ALTISSIMA IN NEW AREAL AND IMPACTS ON BIODIVERSITY

C. BOSTAN, F. BORLEA, Corina MIHOC, Adelina Maria BECENEAGA

*Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara, Calea Aradului Street, no. 119, Timișoara, Romania*  
Corresponding author: bostancristian2000@yahoo.com

**Abstract:** The ecological and economic impact of invasive species is perceived at all levels, locally, regionally and globally. The ecological invasion is considered the second serious threat to natural habitats by their fragmentation and loss. Plant invasion is a difficult phenomenon to control if the processes and factors involved are not sufficiently known. By discovering the determinants of invasion success at any scale, and the efforts to control them, we help the increase of the effectiveness in controlling this phenomenon. *Ailanthus altissima*, invasive species of trees, was regarded as "the most serious threat to natural areas", which can cause major losses of biodiversity and can eliminate native species occupying the same ecological niche. When disappearing species are of economic interest, loss of biodiversity is accompanied by substantial economic loss as well. The aim of this work was to study a habitat in Romania that suffered from an influx of *Ailanthus altissima*, to determine how widespread it is, which are the areas occupied by it and the consequences on biodiversity. The study was conducted in an area of the Natural Park Porțile de Fier namely in Moldova Nouă - Berzasca. Direct observations were made on species *Ailanthus altissima*, its spread was recorded in the study area Moldova Nouă – Berzasca, as well as tree height and diameter. The research conducted in the field has revealed the presence of the specie both in clusters, alignments and isolated specimens (solitary) on the Danube and the base of the slopes. This is explained by the fact that the species is favoured by the anthropogenic intervention in the natural ecosystems and the current climate changes. Besides its multiplication and natural spread, the species has become more present as a result of anthropogenic activity. Our studies have demonstrated the need for further monitoring to track progress and species spreading, as well as the need to start eradication actions to stop this invasion as the main threat to the biodiversity of the area.

**Key words:** *Ailanthus altissima*, spread, impact, new areal.

### INRODUCTION

The main factors that directly affect biodiversity are habitat degradation, climate change, overexploitation, pollution and invasive species.

Invasive species, along with habitat loss and fragmentation, are major factors leading to the decline of biodiversity and degradation of ecosystems (PIMENTEL, 2000; FLORY, 2009).

Through man's influence, physical barriers that lead to the creation of individual regional flora and fauna ceased to be an obstacle, so that there are species arriving either accidentally or intentionally, in localities hundreds or thousands of miles away from their normal habitat (FAO, 2010).

Such is the case of the species *Ailanthus altissima*, commonly known as the "tree of heaven", *ailanthus*, *cenușer* or in standard Chinese as *chouchun* (smelly tree) a tree belonging to the *Simaroubaceae* family.

It originates in China, but has proliferated in temperate climates around the world, in Romania being introduced for plantations on degraded land in order to strengthen the coasts and slopes. *Ailanthus* is a pioneer invasive species that spreads quickly in disturbed areas and

includes three varieties: *Ailanthus altissima* var. *sutchuenensis*, *Ailanthus altissima* var. *altissima*, *Ailanthus altissima* var. *Tanaka* (www.efloras.org).

It was regarded as "the most serious threat to protected natural areas" (McKNIGHT, 2004). Although many of the species of *Ailanthus* are endemic in Asia and Australia, the species *A. altissima* has spread to Europe and North America. Besides the natural habitat of China, *Ailanthus altissima* has developed a secondary complex consisting of all continents except Antarctica (HU 1979).

Due to the growing volume of plant and animal materials transported around the globe with increasingly diverse origin, the possibility of introducing invasive species is, in turn increasing (CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS).

Finally, after a few years or decades, a species can spread in many countries and thus become virtually impossible to eliminate (DIHORU, 2004).

Most natural replacement phenomena are manifested in mixed forests where the behaviour to humidity, heat, light, longevity, growth vigour are very different, and human intervention can hasten or delay these changes in composition (IANCU, 1999).

In 2008, an initial estimate assessed costs generated by invasive species in Europe 9600-12700 million per year (KETTUNEN et al. 2008). If eradication is not feasible, control measures should be implemented and/or containment (BRUSSELS, 2008).

Directives regarding the natural habitat (BIRDS DIRECTIVE 79/409/EEC and HABITATS DIRECTIVE 92/43/EEC) prohibit the introduction of some species into the wild that can threaten the indigenous species.

The purpose of this paper is to study a habitat that has suffered an influx of *Ailanthus altissima*, in order to determine the extent to which expansion occurs and the areas occupied by it.

#### **MATERIAL AND METHODS**

The biological material studied was the woody plant species *Ailanthus altissima*.

In the research and field trials the following methods were used: direct observation method; GPS usage for spotting the *Ailanthus* specimens; using the biometric with the *Ailanthus* specimens; statistical processing of the results.

The research methods used were not harmful, based on measurement of the trunk with the forest die, the tree height with the help of the dendrometric pendulum and locating the species of *Ailanthus altissima* by using the GPS.

#### **RESULTS AND DISCUSSIONS**

To assess the distribution and spread of invasive species *Ailanthus altissima*, the chosen area for the study was the route between localities Moldova – Nouă and Berzasca, an area that is included in the protected area *Parcul Natural Porțile de Fier*.

In order to highlight the invasive species and their existence in the past in the studied area the silviculture belonging to the Danube limit forest was taken under study.

For this purpose, silviculture data were analysed from areas like Berzasca Forestry and Moldova Nouă.

The distribution of studied species *Ailanthus altissima* was established as a result of processing data from the silviculture and field observations. After studying the silviculture, it was noticed that the invasive species *Ailanthus altissima* was not found in the forest structure of the composition.

*Ailanthus altissima* species distribution on the route Moldova Noua - Berzasca is represented in fig. no 1. Through the analysis on the points where the presence of the species was identified it shows that it is much more common in the area of Coronini, where the invasiveness of the species is more predominant. Also, field research showed that *Ailanthus altissima* is more present on the mountain side is at the base of the slopes than on the Danube side. This may be due to the fact that in the past plantings were made with species *Ailanthus altissima* to stabilize slopes, where it can be concluded that in addition to multiplication and spreading in a natural way, the species has become more present as a result of anthropogenic activity .

The study was aimed at determining the height and diameter of the species investigated. Results were statistically analysed, achieving correlations between the diameters and heights of trees analysed, the arithmetic average, geometric average, standard deviation and frequency.

The results are shown in figure 2.

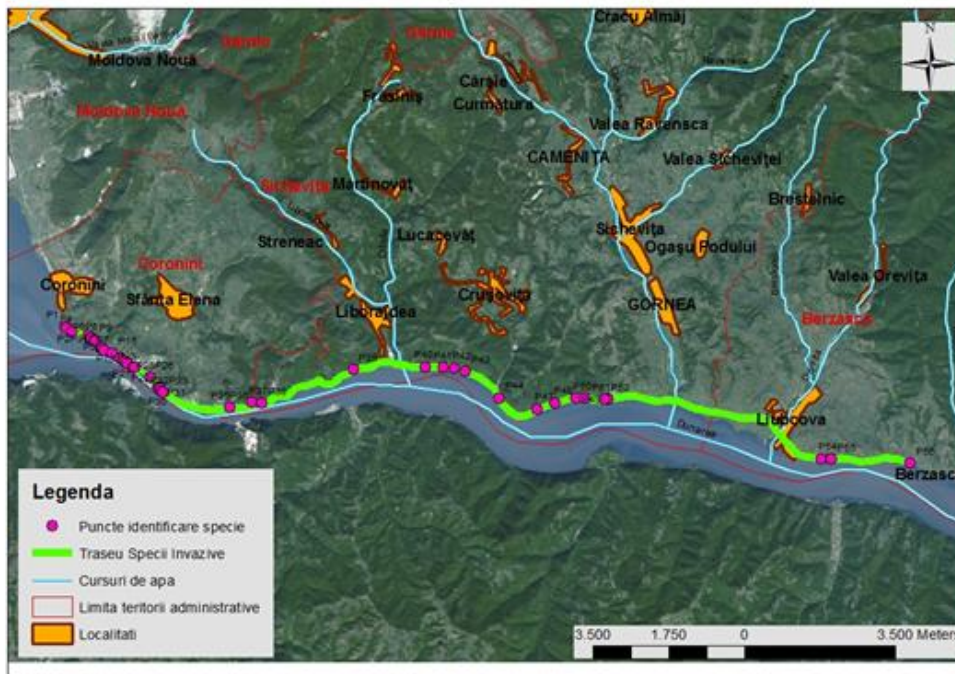


Figure 1: The distribution of the species *Ailanthus altissima* the areal Moldova Noua-Berzasca

From the results presented it shows that diameters vary between 0.5 cm and 19.5 cm, the arithmetic average of diameters being 4.009 cm and the geometric average 2.72 cm. The height of the specimens vary between 0.5 m and 15 m, the average of the height being 5.2 m and the geometric average of 3.23 m.

The standard deviation of the diameter is 3.7 and the standard deviation of heights is 4.57. The values of the correlation coefficient suggest that between the diameter and height there is a strong and direct link, a significantly direct correlation, i.e. they covariate.

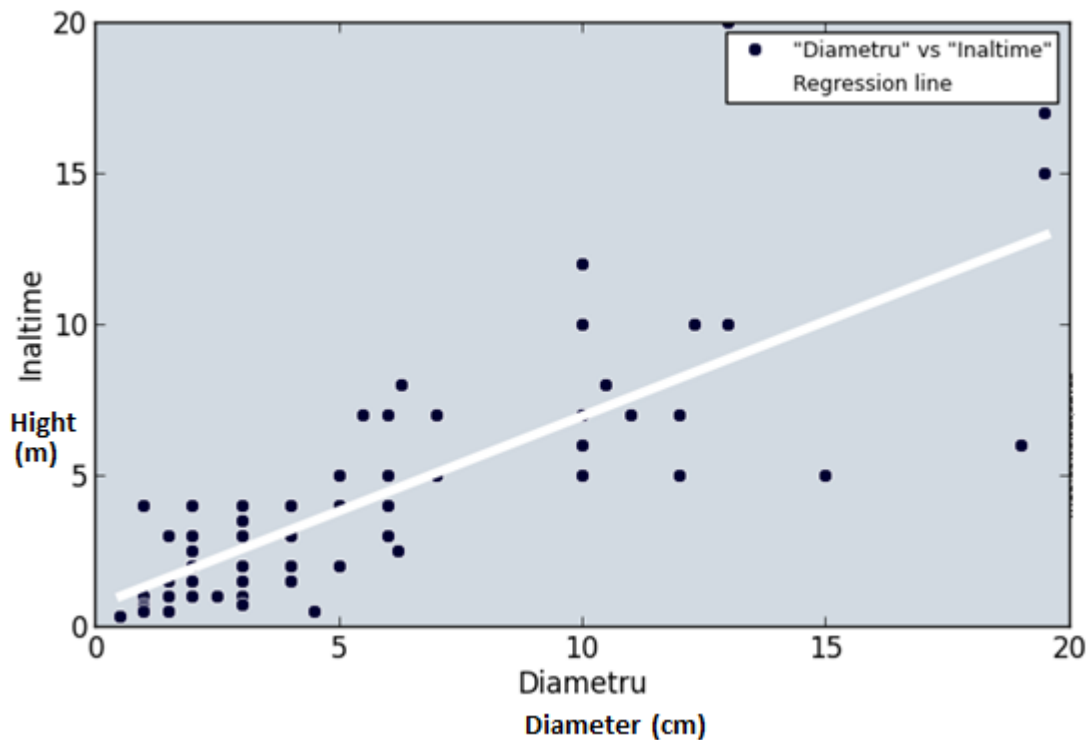


Figure 2: Linear regression between diameter and height of trees

### CONCLUSIONS

Based on studies conducted on invasiveness, distribution, inventory and biometric of *Ailanthus altissima* species in the area of Moldova Noua – Berzasca, the following conclusions have been drawn:

- ❖ The research conducted in the field have revealed the presence of invasive species *Ailanthus altissima* between localities Moldova Noua and Berzasca, both species are present in clusters, alignments and isolated specimens on the Danube banks and slope bases;
- ❖ The species is predominant in the area between the localities Coronin and Sichevița.
- ❖ Besides the natural multiplication and proliferation of species *Ailanthus altissima*, the species has become more present as a result of anthropogenic activity;
- ❖ Our studies have demonstrated the need for further monitoring of the species *Ailanthus altissima* for tracking its evolution and spread, as well as for starting the eradication actions to stop the invasion caused by it as the main threat to the biodiversity of the area.

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