

## **COMPETITIVENESS OF INVASIVE SPECIES OF WEEDS AND THEIR NEGATIVE IMPACT ON THE ECOLOGICAL STATE OF BIODIVERSITY**

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**Анотація.** Зменшення щільності зростання та ослаблення біорізноманіття є однією з найважливіших екологічних проблем сучасності, що суттєво впливає на функціонування екосистем. Інвазивні види бур'янів, завдяки своїм адаптивним особливостям, створюють серйозну загрозу як природним, так і аграрним екосистемам, витісняючи місцеві види та порушуючи екологічний баланс. Дослідження, виконані на території західного Лісостепу України (2018-2023 рр.), показали, що інвазійні види адаптуються і активно розвиваються на легких за гранулометричним складом ґрунтах. Глобальні зміни клімату сприяють процесам деградації біорізноманіття. Наукові рекомендації контролювання інвазивних видів рослин ґрунтуються на виконанні системи заходів з моніторингу, очищення техніки, використання сертифікованого насіння, знищення заражених рослин та обмеження їх проникнення і „міграції”.

**Ключові слова:** бур'яни, інвазія, екологія, деградація біорізноманіття.

**Abstract.** The decrease in the density of growth and weakening of biodiversity is one of the most important environmental problems of our time, which significantly affects the functioning of ecosystems. Invasive weed species, due to their adaptive features, pose a serious threat to both natural and agricultural ecosystems, displacing local species and disrupting the ecological balance. Research carried out in the territory of the Western Forest Steppe of Ukraine (2018-2023) showed that invasive species adapt and actively develop on soils with a light granulometric composition. Global climate changes contribute to the degradation of biodiversity. Scientific recommendations for the control of invasive plant species are based on the implementation of a system of monitoring measures, cleaning of equipment, use of certified seeds, destruction of infected plants and limitation of their penetration and "migration".

**Key words:** weeds, invasion, ecology, degradation of biodiversity.

The depletion of biodiversity is one of the most significant environmental problems of our time, which has serious consequences for ecosystems and human society. Invasive weed species, due to their adaptive properties and ability to rapidly multiply and spread, become one of the main threats to natural and agricultural ecosystems. Species entering new environmental conditions mainly compete with local plant species for resources and suppress their biodiversity [1-2].

Suppression of biodiversity affects the sustainability of ecosystems and their functionality. Invasive weeds influence the change in the structure of plant communities, disturb the natural balance and lead to a decrease in the productivity of agricultural crops. At the same time, they are able to influence the phytosanitary properties of the soil and air, the water regime and the general ecological state of the range of their distribution [3].

It is worth noting that more than 60% of the natural ecosystems of our planet are already degraded, and invasive plant species are a threat to their existence. According to the influence on the natural ecosystems of the planet, of which only 40% have been preserved in our country, experts at the global level have recognized invasive species among the five determining factors (change in natural habitats, climate change, invasive species, techno- and anthropogenic load, pollution (nitrogen, by phosphorus) [4-5]. Unfortunately, it is also important to add the full-scale invasion of Russia into the territory of Ukraine, which, of course, has a negative effect on the intensification of invasive processes in the near future.

Scientists have been recording the migration of alien species of plants to the territory of Eastern Europe for several decades, together with the growth of economic activity on the planet and the development of international trade. Global climate changes only accelerate this process [6].

Having appeared in a new territory, invasive species show their rather aggressive characteristics: they suppress the plants that originally grew, interrupt the connections established for thousands of years in ecosystems and lead to floristic pollution of the territory, as a result of which the aboriginal flora is impoverished [7].

Biodiversity of Ukraine is "occupied" by widely known and not yet common representatives of invasive plants: *Ambrosia artemisiifolia* L., *Heracleum sosnowskyi* M., *Solidago canadensis*, *Erigeron canadensis* L., *Delphinium*, *Cicuta virosa* L., *Asclepias syriaca*, *Phytolacca americana* L., *Iva xanthiifolia*, *Acer negundo*, *Xanthium strumarium* L., *Elaeagnus angustifolia* etc. Information about these plants should be as accessible as possible not only to specialists in the agricultural sector, but also to the general population (starting with preschool education institutions) [8].

As a result of suppression of local plant species, local species of animals, fungi, various microorganisms, which built trophic relations with the aboriginal flora for many centuries, disappear. That is why the invasion of an alien species leads to the death of a large number of species of flora and fauna, and in such an environment only one or several alien species dominate [9].

Recent studies have shown that the most species-rich ecosystems are the most vulnerable to invasions. This is confirmed by the results of research by scientists in North America, Australia, South Africa, the Hawaiian Islands, California, and the Mediterranean, where ecosystems with a high level of biodiversity were particularly sensitive to new invasions [10-11].

Since 2018, we have started monitoring the presence and spread of invasive weed species on the territory of the Western Forest Steppe of Ukraine. .

An analytical review of literary sources [12-15] and our observations indicate that the physical properties of soils and climatic conditions (in particular, annual precipitation, average air temperature, evaporation index) are the main factors that determine the degree of spread of invasive weeds. It has been established that uncompacted and light granulometric composition of soils is more favorable, compared to other soil types, for the adaptation, development and spread of invasive plant species.

Our analysis of long-term meteorological data shows a tendency to decrease the amount of atmospheric precipitation and its extremely uneven distribution in the summer period, which is accompanied by an increase in the average annual temperature and, as a result, an increase in annual evaporation. Such conditions create favorable opportunities for the expansion of alien plant species on the territory of Ukraine. A decrease in precipitation and an increase in air temperature contribute to the spread of invasive species, because they are able to adapt to changing conditions faster than native plants that are already under environmental stress.

Our research results indicate that it is necessary to focus attention on the development of effective strategies for controlling invasive plant species and adapting agrotechnical and environmental protection measures to new climatic conditions to prevent further degradation of biodiversity and support the ecological stability of the region. They are initially aimed at the management of individual species and gradually develop into more complex integrated management strategies. It is important to consider the long-term impact of selected control programs on the ecosystem to ensure the effectiveness and sustainability of the measures.

Among the main tasks of combating invasive species, the prohibition of their planting, reproduction and distribution takes first place.

At the same time, it is necessary to consider each species separately, taking into account its invasive characteristics. To prevent the spread of invasive plants, it is advisable to take the following measures:

1. Cleanliness of vehicles and equipment. Vehicles and equipment must be cleared of invasive plants and seeds to avoid their accidental transfer to new areas.

2. Minimization of soil disturbance. During construction and maintenance, soil disturbance must be minimized to avoid creating favorable conditions for the propagation of invasive plants.

3. Creation of a group of medicinal plants. Promoting the formation and maintenance of healthy plant communities that can reduce the impact of invasive species.

4. Restriction of movement/movement of contaminated soil and gravel. Movement of soil or gravel containing weeds should be limited to prevent their spread.
5. Use of certified seed mixtures. Use of certified weed-free seed mixtures.
6. Disposal of infected plants and introduction of quarantine areas. Timely disposal of invasive plants in infected areas and fight against new cases of infestation.
7. Control of processes of movement/spread of invasive plant species. Preventing the movement and limiting the spread of invasive plants between adjacent land plots or administrative territories.
8. Control of processes of movement/spread of invasive plant species by transport routes. Highways, railroads, and waterways often serve as corridors for the spread of invasive plants.
9. Protection of uninfected territories. Protection of territories clean from invasive plant species from pollution.
10. Information campaigns. Informing the general public about the dangers of limited-spread weeds through the production and distribution of informational materials (books, booklets, tables, posters, albums, visualization, information technology, training, conferences).
11. Storage of equipment. Keeping machinery and vehicles clean to prevent the accidental transfer of invasive plant species.

The specified measures are part of a complex and integral component of the strategy, which must be adapted to the specific conditions and types of invasive plant species in order to achieve the maximum effect in the fight against them and maintain the ecological sustainability of the territories.

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