

Invasive Plant Species, the Enemy of Biodiversity

Alin HAPCA

Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca,
Romania; alin.hapca21@gmail.com

Abstract. Once with the appearance of the human kind in the history of our planet, he constantly tried to shape the environment in which he placed his activities. Being an excellent hunter and a fruit gatherer, later a farmer, he influenced the ecosystem bounds and divided the ecosystems and habitats. These interventions, on purpose or accidental, created some ecological niches on which invasive plant species didn't hesitate to conquer. Once with the demographic explosion, human desire to reach the end of the Earth facilitated the transport of different plant and animal species, implementing them on the new explored areas, those becoming invasive species. These "exchanges" of plants and animals conducted to the environment degradation and draw major consequences by the extinction of numerous local species of plants and animals.

Key words: biodiversity, invasive plants, extinction, conservation, ecological impact

INTRODUCTION

Leaving organisms by their activities lead to the modification of the environment in which they coexist. Human is no exception from these rules. In his actions, from the time he practiced hunting, and later cultivating grounds and creating domesticated animals, the human society shaped the environment or life. Natural habitat fragmentation damages the quality and facilitates the appearance of imbalances.

The human population impact over the environment is felt at great distances, because it could consume the natural resources obtained in other areas of the world. Coffee, caviar, fish, tea are exploited in different areas in which biological diversity is endangered and consumed in areas with large population density (Maxim *et al.*, 2010).

Over time, human population transported, by purpose or accidentally, different species of plants or animals, which found their place of development in the new ecosystems. Most of the new species disappear but profit from the propitious and imbalances conditions of the ecosystem, multiplying, becoming a real threat for the local biodiversity ecosystem (Costa, 2005).

Trade globalizations and excessive growth represents the base of invasive species spreading both by transport and introduction of new species but also by exploitation of some resources bringing them to extinction.

In the context in which agriculture occupies more and larger terrains, in combination with other factors such as natural ecosystems fragmentation, irrational exploitation of natural resources, pollution, climate change, leads to the deterioration of Earth's biodiversity and opening gates for invasive species.

New introduced specie can become invasive if it wins the competition over resources with local species. Light, space, nutrients, water are the temporarily divided resources by new introduced species with the local ones, but, gradually, due to higher competitive ability it occupies larger terrain by eliminating local species.

MEASURES OF BIODIVERSITY CONSERVATION AND CONTROL OF THE INVASIVE PLANT SPECIES

A question of topical is represented by the conservation of the existent biodiversity and the appearance in different ecosystems of invasive species. Invading species ecology is one of the youngest branches of ecology that develops rapidly.

The spread of non-local species, in the last years, has made the scientific world and even some political structures to take a statement. Thereby, by the Convention on Biological Diversity (CBD) which took place at Rio de Janeiro in 1992, contracting parties oblige itself to control or eliminate those foreign species which threatens the ecosystems, habitats or species (Anastasiu and Negrean, 2007).

At a global level, IUCN (The World Conservation Union) assumed an important part against invasive species. This organization through a group of specialists (Invasive Species Specialist Group – ISSG) elaborated a list of the invasive species and developed a set of rules with the purpose for the prevention of biodiversity caused by invasive specie (Anastasiu and Negrean, 2007). IUCN mission is to influence, encourage and assist worldwide societies to protect and conservation natural biodiversity but also to control any use of natural resources in order to be ecological sustainable (Maxim *et al.*, 2010).

At Hague in 2002, CBD signatories adopt a Global Strategy for Plant Conservation. A very important point on this strategy was the elaboration of the invasive species list for each country (black list) and plans of management for the most aggressive of them. On the European level there were intensified the efforts to reduce invasive plants, to understand the biological invasion phenomenon, to detect the impact of the phenomenon over ecosystems and human health. There were developed different programs for prevention and human information over the major impact that these invasive species could have over biodiversity, ecosystems and even health. Numerous nongovernmental organizations militates against overexploitation of natural resources having as a common purpose nature protection, decrease of deforested areas, reduction of atmosphere emissions and dangerous waste, and the list can go on.

WCMC (World Conservation Monitoring Centre) it's a non-profit organization that maintains a data base with worldwide protected areas. This data base is actualized periodically (once for 3 years) in order to integrate the new declared protected areas for the global catalog of protected areas (Maxim *et al.*, 2010).

Romania adopted the European strategy of conservation by implementing “Natura 2000” project in which numerous areas of local and national interest entered in this project having as a base the community legislation of protection and conservation.

ECOLOGICAL AND ECONOMICAL IMPACT OF INVASIVE PLANT SPECIES

Ecological impact of invasive species at a global level has often disastrous effects. Natural habitats fragmentations, new ruts of transportation, urbanization, intensive agriculture, climate change are the main causes that lead to overboard movement of the species. In the last years, the invasion speed grew exponentially indebted to greater unbalances created natural but also anthropic activities. This speed can be written under the following form:

$$\square_i = \frac{ds}{dt}$$

\square_i - Speed of invasion

ds - Geometric area occupied by de invasive plant specie

dt - Time (biological cycle)

This speed can be influenced by different factors, from climate to pedological, anthropic, geographic, and so on, and *ds* directly proportional with the sum of these factors.

An ecosystem represents an assembly of functional elements, interdependent, which form an unity sufficiently delimited. Thereby, forest, meadow, lakes and swamps are well defined natural ecosystems that function under real and delimited rules (Rotar and Carlier, 2010). The apparition of an imbalance in the ecosystem creates opportunities on which invasive plants successfully profit. The imbalance is needful to any (D'Antonio *et al.*, 1999). The ecological disequilibrium is defined as a disruptive event of the ecosystem which took place in time and space modifying population, substrate resources and the physical environment (Pickett and White (1985) quoted by Maxwell *et al.* (2003).

Many researchers affirm that the most disruptive areas are the ones located near transportation routes and farmland. These areas usually contain most of the invasive species. The disturbed ecosystem release resources in which invasive plants can use more rapidly than local species, that leads to out of competition local (Sax and Brown, 2000).

Invasive species impact over the ecosystem

Invasive species can distort affected ecosystems by introducing large scale changes. Initially, changes take place over vegetal diversity and its structure causing structure degradation direct or indirect, disturbing main bio-geo-chemical cycles (Pauchard, 2002). Invasive species can change geomorphologic characteristics of an ecosystem by structure modification of a habitat underlining the forms of degradation of this habitat.

Water and mineral substances competition makes the difference between invasive plant species and the local ones. Some researches showed that evapotranspiration in an invaded ecosystem is higher than in the initial one, and the fight for mineral substances is by far won by invasive plant species (Marck *et al.*, 2000).

A single invasive species, once installed, can facilitate the invasion of another one leading to the suppression of the first specie, but it can become more invasive and can destroy the local species abundance. Even a failed invasion can influence on a long term in the vegetal community dynamic. (Booth *et al.*, 2003).

Economical impact of invasive plant species

Natural resources are essential for many states around the world for food but also for economical growth. Meadows are natural resources important for a state, and their good administration can lead to biodiversity conservation and substantial economic incomes.

Plant invasion determines higher ecological and economical costs, some economical costs are easy to calculate (the cost of weed control, harvest losses, sediment deposit, erosion), and some can't be evaluated (ecosystem disruptive, lost of recreational land, esthetic degradation) (Pimental *et al.*, 2000).

Economic damages of invasive plant species entered in the economist's attention, but they use only experimental techniques of loss. Economic estimation of the impact on invasive plant species is by far the real values because we cannot estimate the price of ecosystem benefits offered to the human kind. Human, by his nature, provide economic value only to a part of the ecosystem, tangible material, easy to exploited and measured in standard mass units. Wood, animals, pharmaceutical products, food construction materials are equated by standard mass units of measurement with economic values.

The services offered by the ecosystem are, for the moment, hard to value because we can't economic evaluate air and water purification, climate adjustment, soil regeneration and fertilization, decomposing of organic matter, the maintenance of biological diversity. The

complexity of these relations is hard to understand by the economists and differs from the ecologists and people who conceive environmental policies. Natural processes which took place in an ecosystem such as: nitrogen, carbon cycle, is not evaluated when impact studies are made, these not being considerate values from costs point of view. Thereby, Booth et al., (2003) lunches a question "... when the invasion of a specie determines the extinction of another, which is the value of the loss?..."

CONCLUSIONS

In order to track the invasion of a species is necessary to establish measurable quantities, such as the speed of invasion, invasion potential, etc.

The invasion speed grows with the imbalance factor sum in an ecosystem.

The spread of invasive species is due to human wishes to explore and to dominate new territories.

Climate changes underline invasive species development in the new areas having higher critical thresholds than the local species.

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