Butterfly Community Conservation Through Ecological Landscape Design in Urban Areas

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BulletinUASVM Horticulture 73(2) / 2016

Print ISSN 1843-5254, Electronic ISSN 1843-5394

DOI:10.15835/buasvmcn-hort:12223

Abstract

Due to urbanization and extension of agricultural areas most of the ecosystems are strongly affected. As a result, preservation of biodiversity becomes more and more important aiming to reestablish the lost habitats of different species (mammals, birds, amphibians, insects etc.). Our research focuses on butterflies which constitute an extremely important group of 'model' organisms. We have identified 15 diurnal '*flying beauties*' specific to Cluj area (threatened and unthreatened species) and investigated their ecological requirements that have to be provided for in any landscapes. Furthermore, based on the data collected we have illustrated the utility of our approach by applying it to a hypothetical private garden following the traditional environmental guidelines in our landscape design.

Keywords: *blooming plants, host plants, landscape design, Lepidoptera, urbanization*

Introduction

Insects are the most important group of animals, representing more than 50% of terrestrial biodiversity. In contrast to other groups of insects, butterflies are easy to recognize and popular. They use the landscape at a fine scale and react quickly to changes in land use, and to processes such as farmland intensification or habitat fragmentation due to urbanization (Van *et al.*, 2012). In Romania from the total number of lepidopterans (aprox. 4000), 203 butterflies were identified. In the last 30-50 years the number of lepidopterans decreased significantly due to afforestations with exotic species, application of modern agricultural practices abandoned the traditional pesticide-free methods, and the use of "unproductive" lands for constructions (Rákossy, 2013). In this context, creating butterfly gardens in urban areas would diminish the risk of extinction of this flagship taxa.

Aims and objectives

This research was carried out to identify some lepidopterans, mostly diurnal butterflies, specific to Cluj area. In order to contribute to biodiversity

conservation an ecological landscape design was done to call this '*flying beauties*' back to city gardens. The main function of butterfly gardens is to provide butterflies a friendly habitat in a matrix that otherwise would be unfriendly because of human domination of the urban landscape.

Materials and methods

Several field trips were organized to identify the most common and the rarest butterfly species in the surrounding areas of Cluj (Table 1). The plant selection for the new ecological garden design was made according to the ecological requirements of the identified butterflies depending on their developmental stage.

This butterfly garden is green area created especially to attract a diverse community of butterflies. This garden includes nectar plants for adult butterflies, as well as food plants for larvae and caterpillars. In addition, in our new landscape we also used some specific abiotic elements that are indispensable for a butterfly garden such as puddles, rocks and non-flower sources of food. The landscape design softwares used for this

Tab. 1. Field study results

Identified species	Location	Host plants	Nectar plants
<i>Aglais urticae</i>	Hoia	<i>Urtica dioica</i>	<i>Buddleja sp., Lantana sp., Tagetes sp., Dianthus sp.</i>
<i>Aphantopus hyperantus</i>	Apuseni Mountains	<i>Carex sp., Festuca sp., Poa sp., Calamagrostis sp., Agrostis sp.</i>	<i>Cirsium sp., Sambucus ebulus</i>
<i>Araschnia Levana</i>	Florești	<i>Urtica dioica</i>	<i>Apiaceae, Cirsium avense, Sambucus ebulus, Eupatorium cannabinum, Ranunculus sp., Origanum</i>
<i>Brintesia circe</i>	Tarnița	<i>Bromus erectus, Festuca bovina, Poacea</i>	<i>Buddleja sp., Lavanda sp., Scabiosa sp.,</i>
<i>Aglais io</i>	Cluj-Napoca	<i>Urtica dioica, Humulus lupulus</i>	<i>Echinacea sp., Buddleja sp., Astilbe sp., Sedum sp., Dahlia sp., Aster sp.</i>
<i>Limnitis populi</i>	Apuseni mountains	<i>Populus tremula, P. nigra</i>	<i>Solidago sp., Phlox sp., Non-flower sources: rotting fruit, sap, animal droppings</i>
<i>Nymphalis vaualbum</i>	Băișoara	<i>Populus sp., Salix sp., Betula sp., Ulmus sp.</i>	<i>Zinnia sp., Asclepias sp., Buddleja sp., Tree sap</i>
<i>Vanessa atalanta</i>	Feleac	<i>Urtica dioica</i>	<i>Buddleja sp., Echinacea sp., Zinnia sp., Lantana sp., Aster sp.</i>
<i>Vanessa cardui</i>	Blue Lagoon (Aghireșu)	<i>Cirsium sp., Carduus sp.</i>	<i>Salvia sp., Lantana sp., Echinacea purpurea, Buddleja sp., Aster sp., Zinnia sp., Tagetes sp.</i>
<i>Iphiclides podalirius</i>	Sic	<i>Crataegus monogyna, Prunus spinosa, P. fruticosa, P. tenella, Rosaceae</i>	<i>Asclepias sp., Phlox sp., Buddleja sp., Lonicera sp., Hesperis sp., Echinacea sp., Azalea sp.</i>
<i>Maculinea teleius</i>	Făget	<i>Molinia caerulea, Epilobium hirsutum, Sanguisorba officinalis, Lythrum salicaria, Stachys palustris, Prunella vulgaris</i>	
<i>Colias myrmidone</i>	Apuseni Mountains	<i>Chamaecytisus ratisbonensis, Cytisus nigricans</i>	<i>Medicago sp., Trifolium sp., Origanum vulgare, Scabiosa sp., Dianthus sp., Salvia sp., Aster sp., Phlox sp., Sedum sp.</i>

ecological garden were: Realtime Landscaping Architect, Corel Draw, Sketchup and Lumion for a better illustration of our approach.

Results and discussion

The results show that if we take into account the ecological needs of diverse butterflies early in the planning stage of our garden, ensuring them a friendly habitat, we can contribute significantly to the preservation of butterfly populations by creating the conditions necessary for their survival. Moreover, the size of the garden and the number of flowering and host plant species used are directly proportional with the number of butterfly species that are attracted to this kind of gardens (Fahrig, 2001).

Conclusion

In this research, we demonstrated that also landscape architects can have a crucial role in butterfly community conservation, through their abilities to arrange plants in such manner to restore

a part of the natural habitat where these small 'flying beauties' can survive against unstoppable urbanization.

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