URBAN GRASSLAND - A BIODIVERSITY RESOURCE

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Abstract

Urban grassland is a biodiversity resource compared to secondary permanent grassland at different stages of succession. Maintenance work on these areas is generally limited to mowing once or a few times a year, the frequency of which has an impact on the expression of floristic composition and biodiversity. There is a great variability in biodiversity from one year to the next due to the anthropogenic factors, but also to the biotic and abiotic factors involved. The purpose of the work was to highlight recent information regarding the importance of urban grasslands as source of biodiversity, Also, there were mentioned practical examples to speed up the setting and maintenance of extensive groundcovers instead of turf.

Keywords: urban grassland, biodiversity, vegetation, turf, sustainable maintenance.

INTRODUCTION

Well-maintained, perfectly mown turfs are a symbol of the modern urban landscape. Today, turfs take up about 70% of green spaces in cities. With increasing social environmental awareness, however, this concept is beginning to be questioned, namely the usefulness and necessity of high frequency mowing. As an alternative, urban meadows or simply letting the grass grow wild and tall are proposed. Why is this a problem? Given assumptions that almost 70% of the world's population will live in cities by 2050, the careful integration of nature into urban areas is extremely important. This is very important for our mental health and well-being, and for the wildlife with which we will have to share increasingly large urbanised areas (Obluska, 2020).

According with Yang *et al.* (2019) sustainable lawn alternatives are urgently needed in China due to the intensive maintenance of lawns and potential threats to the urban environment due to cultural deficiencies. They have noticed after the analysis of some questionaries addressed to the inhabitants that the establishment of biodiverse lawn alternatives is not welcome in urban areas but may be acceptable in areas with an ecological vision, wetland parks, and suburban areas.

Local authorities often plan to state the value of natural habitats

and agree that the quality and functionality of the green infrastructure must be improved. Such actions require scientific knowledge to create and maintain new habitats that provide ecosystem services in urban and peri-urban landscapes (Mårtensson, 2017).

In an experiment replicated in six urban public green spaces, nine different perennial grassland mixtures were used to quantify the relative roles of floristic diversity and seeded grassland height on the richness and composition of three taxonomic groups of organisms: plants, invertebrates and soil microorganisms. All experimental variants were found to be colonised by plant species that were not sown, suggesting that the establishment of sown grassland did not prevent the subsequent development of grassland locally determined by the soil seed supply, if management was appropriate. Colonising species were rarer in plots dominated by tall and more diverse species, indicating that tall species limit competition and may limit invasion rates. Established urban meadows had different invertebrate and microorganism communities compared to turf. Invertebrate taxa responded to changes in both height and vegetation richness, but most were more abundant where vegetation height was higher. For example, the richness of the *Coleoptera* family has increased with summer plant diversity. The composition of the microorganism community was more strongly influenced by plant species on the soil surface. In the case of deeper soils, microbial community variation was most sensitive to plant height, with bacteria and fungi responding differently. In addition to improving resident satisfaction, urban grasslands have high biodiversity, support richer and more abundant invertebrate communities and more stable communities of plants, invertebrates and soil microorganisms compared to turf. Research results in the field suggest that diversifying urban greenspace by establishing urban grasslands in place of grassed areas generates substantial biodiversity benefits, with a mosaic of grassland types (Norton *et al*., 2019).

Another example of replacing turf with urban grassland comes from UK. Thus, Hoyle *et al*., (2017) were collaborated with the local authorities from Bedford and Luton (United Kingdom), establishing experimental perennial grasslands at seven sites. from 2013 to 2015. After removing the existing turf, the plots were seeded with native and grassland perennial species. Plots were maintained using different mowing frequencies at different hights. There was used a questionnaire to survey the satisfaction of the users of the green spaces from nearby, the results showing the increase of the users' satisfactions for the transformed green spaces.

Fig. 1. The turf has been replaced with a seeded perennial grassland composed of native plants (in 2013 (left) and in 2015 (right) (Hoyle *et al*., 2017).

According to a 2012 article in The Guardian, urban meadows next to tower blocks, children spending their free time in rustic playgrounds, not to mention all those farmers' markets, show that England's cities can't seem to get some of the countryside (Cocoza, 2012).

The London Fields area of east London, for example, is home to a wildflower meadow and woodland area where rangers have built rustic furniture from branches.

This ruralisation of the green spaces in urban areas can be seen throughout Britain, from Kinross to Bristol (Cocoza, 2012).

Urban greening should consider solutions that meet the requirements of the EU Biodiversity Strategy 2030, including improving biodiversity. Urban parks can meet these needs. They often have wide areas proper for designing green infrastructure that include elements of biocenosis, and biodiversity at the level of the landscape (Borysiak and Stępniewska, 2022).

One of the biggest barriers to urban grassland adoption is the perceived aesthetics, but a smart design and a little education can overcome this obstacle in the general acceptance of the urban grassland concept (https://www.urbanmeadow.org/what-is-an-urban-meadow accessed on 15 June 2023).

DISCUSSIONS

Urban grassland definitions

Urban grasslands are self-sustaining plant communities that have low impact and provide numerous ecological services (https://www.urbanmeadow.org/what-is-an-urban-meadow, accessed on 15 June 2023).

Meadows are smart and sustainable ways to preserve or restore green spaces. Urban grasslands are not just "greening" or grassing.

Much of the traditional green space or landscape in urban areas relies heavily on intensive

maintenance to keep plants at the right size, to keep ornamental plants and turf alive and to prevent excessive weed growth. Urban turfs in contrast are much more than just green spaces in cities. They create functional natural ecosystems in cities.

Urban meadows are the opposite of derelict brownfield sites, but also of green spaces that require intensive care at high cost.

Urban grassland consists of plants that grow and thrive well on typical urban soil, create an aesthetically pleasing vegetated area on vacant lots and beyond, and are maintained with minimal effort (Tredici, 2016).

Urban grassland design

Even small areas of wildflowers and tall grass can bring a sense of "country" or "wilderness" in a city. Many disturbed areas with heavily modified substrates have naturally evolved into natural-like habitats with a mix of native and wild plants, creating unique landscapes (https://conservationhandbooks.com/the-urban-handbook/grasslands/ accessed on 18 June 2023).

Sometimes it can take several years for fine grasses and wildflowers to become dominant over weeds. But as each year passes the surface will look better. Following the principle "beauty is in the eye of the beholder" proponents of the urban meadow concept hope that the natural beauty of semi-natural meadows, and the presence of associated wildlife such as butterflies and bees, will find a place in urban areas, as they do not have favourable living conditions in classically grassed ones (https://www.rugby.gov.uk/info/20046/parks_open_spaces_play_areas/345/urban_meadows/3, accessed on 15 June 2023).

Design and establishment of urban meadows, referred to as MEADOWSCAPING is the practice of designing, planting and managing urban meadows to provide ecological functions and benefits such as improved habitat and stormwater quality. As urbanization and intensive agriculture and pesticide use greatly impact pollinators, urban meadow landscaping provides important habitat for many species of organisms in areas that would otherwise lack beneficial native plant species. Urban meadow landscaping not only helps pollinators, but also helps reduce our carbon footprint, conserve and enhance biodiversity, and increase awareness of our natural and cultural heritage (https://greenworkspc.com/ourwork/2020/2/27/the-meadowscaping-handbook-designing-planting-and-managing-an-urban-meadow, accessed on 15 June 2023).

Factors implied in urban grassland development and biodiversity

The factors involved in the setting and evolution of the

biodiversity in urban grassland are biotic, abiotic and anthropic.

The main ***biotic factors*** implied in the development of urban meadows are: soil seed bank and propagules driven by different natural vectors (e.g. animals, wind, water *etc*.) and soil microbiota (microflora and microfauna).

Abiotic factors influential for urban meadows are: climate, soil fertility, water supply, shading etc.

Some of the ***anthropic factors*** with implications in urban grassland biodiversity are: transport of persons and goods, maintenance works (seeding, trimming frequency, over-seeding *etc*.), building activities, bringing in biological material from other sources (seeds, microorganisms, fertile soil from dethatching *etc*.).

According with the research developed by Hitchmough *et al.* (2017), the interaction between two canopy layers in a seeded herbaceous perennial plant community was studied over a period of five years to see if it was possible to create an urban landscape vegetation that was both flower-rich during a long period of time and has the ability to cope with weed invasion at very low maintenance levels. They concluded that such vegetation forms an attractive and sustainable design model for growing herbaceous plants communities in urban landscape spaces.

Common management practices can directly and indirectly influence soil factors in urban grasslands, which in turn can influence the microbial-mediated processes from the soil (Thompson and Kao-Kniffin, 2019).

Wildflower meadows have high biodiversity value and can grow in degraded areas where nitrophilous species can dominate. This makes them suitable for use in peri-urban and urban areas, promoting local flora, creating habitat for pollinators and other small animals, and increasing overall biodiversity (Fernandes *et al*, 2023).

Increased structural complexity and diversity of plants increases heat mitigation and arthropod biodiversity in the habitats of low-height urban green infrastructure (Francoeur *et al.*, 2021).

Also, urban green spaces are often subject to intensive management and therefore provide habitat for only a small number of plant and animal species. Several studies have already shown that less intensive management of semi-natural grassland habitats from urban area can increase biodiversity, including butterflies (Christoffer *et al.*, 2021).

Urban grassland vs. turf

Urban wildflower meadows have the potential to provide important nature-based solutions that simultaneously address to the biodiversity, climate crises and benefit society. Thus, in a study

developed at King's College Cambridge (UK) on a lawn first established in 1772 it was demonstrated that small urban meadows, when provided at a lower cost in comparison with the maintenance of the traditional lawns, offer significant benefits for local biodiversity, cultural ecosystem services, and climate change mitigation (Marshall *et al*., 2023).

Urban grassland vegetation is often perceived by residents and decision-makers as "messy" and undesirable, especially in urban areas, and there is a tendency to overlook or ignore the ecological value of naturally occurring grasslands, perhaps distracted by its seemingly "chaotic" aesthetic (Filibeck *et al*., 2016).

According with Barne *et al.* (2018), the question around the world is whether to move away from commonly used vegetation cover options in urban environment that require many inputs (e.g. water, fertilizers, pesticides) and intensive management (e.g. lawn clipping, sowing etc.) to more sustainable, low-input, low-management vegetation covers. During the research overall, managers expressed a positive view of low-input grasses, demonstrating interest in transitioning to more sustainable management. They have also shown significant support for city programs to convert public and private land to low-input urban land, e.g. using low input lawn species.

In Table 1 is presented a comparison between the urban grassland and turf. It is obvious that, at least from ecologically friendly and cost-effective perspectives, urban grasslands are more suitable in the context of sustainability. The acceptance of this solution

Table 1

Urban grassland versus turf

Urban grassland	**Turf**
• It is a refuge for pollinators, invertebrates and small vertebrates; • More efficient carbon sequestration compared to urban turfs; • Lower carbon footprint compared to maintenance-intensive green spaces; • Lowers ambient temperature; • Contributes effectively to emotional well-being; • Reduced energy consumption and maintenance inputs.	• Short mown turfs designed for recreational use are dominant form of urban green space in temperate regions; • requires intensive maintenance at high cost; • Short durability without maintenance; • usually provides limited habitat value for most taxa; • Has very low biodiversity; • Not suitable for pollinators due to the application of pesticides for maintenance and the high frequency of the works applied on it.

According with Sehrt *et al.* (2020) reducing mowing is a simple and effective measure to increase biodiversity in urban grasslands.

The formation of urban grassland communities is the result of several spatiotemporally distinct processes. Carrying out extensive grass mowing and giving high conservation priority to the grasslands with a habitat connectivity it will reduce the risk of endangered species loss in suburban landscapes. The hypothesis is that this may be a promising tool for conserving grassland species in urban area (Tsuzuki *et al*., 2020).

Maintaining species richness alone is not sufficient to ensure the provision of ecosystem services related to other functions such as water and nitrogen use (Onandia *et al*., 2019).

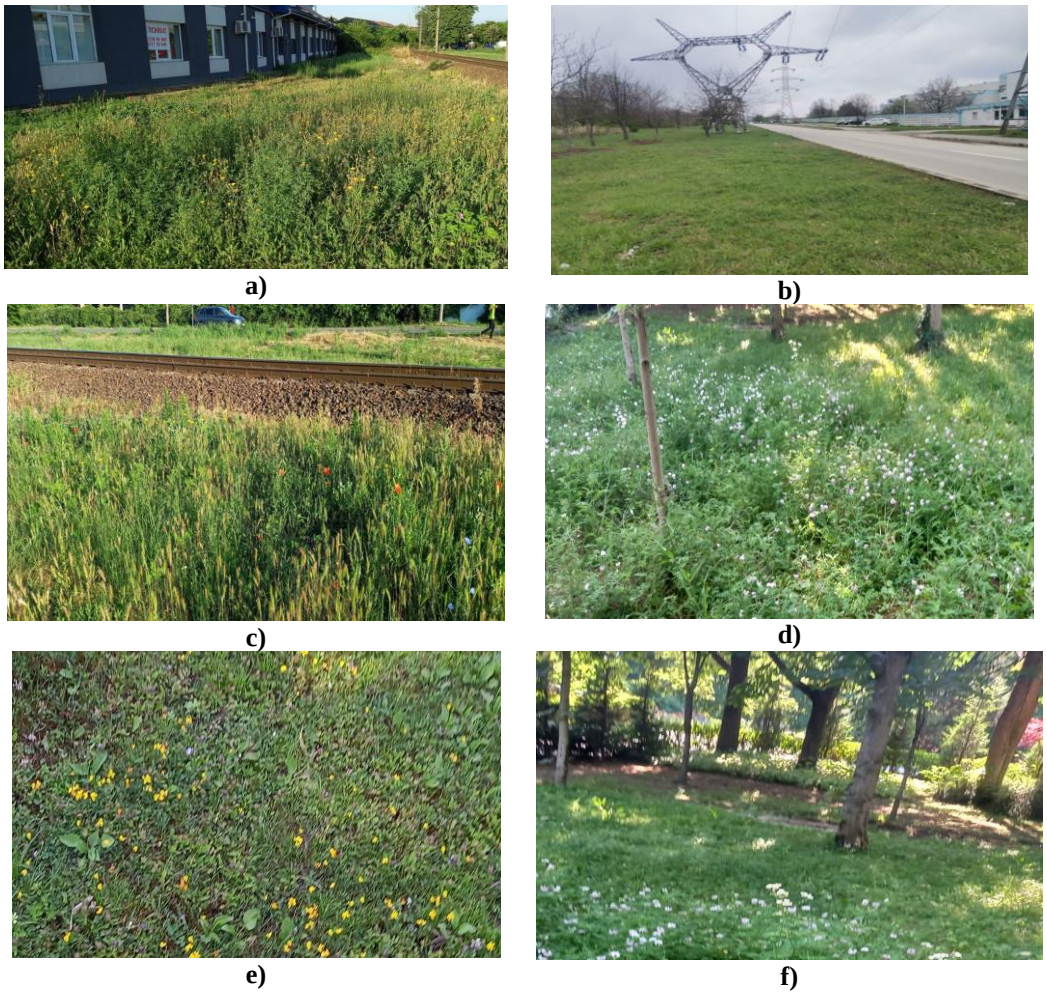

Fig. 2. Examples of urban meadows from Romania: a), b), c) images from Timișoara; d), e) and f) images from Râmnicu Vâlcea (photo a, c, d, e and f by Daniela Poșta; photo b by Veronica Sărățeanu)

CONCLUSIONS

The biodiversity of urban grasslands can be much higher compared to many types of permanent grassland due to the many more variables involved in the formation of its vegetation cover.

The evolution of urban grassland biodiversity involves a very wide variety of intervening vectors, most of which are anthropogenic, such as construction, soil mobilisation or removal, transport, landscaping *etc*.

Even if the impact of natural factors is less in urban areas, they still play an important role in the formation and evolution of these urban vegetation covers, such as wind, birds, soil seed bank, pollinators *etc*.

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