

IMPACT OF PERENNIAL FLOWER PLANTS USED IN LANDSCAPES IN BUCHAREST

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Abstract

Urban landscaping such as green squares, flowerbeds and green pills are the most common, most numerous and most exposed to traffic. Cities in the European community and major cities worldwide are increasingly using perennial flowering plants in urban landscaping and investing in research into the adaptability of these types of plants to harsh urban conditions. Bucharest is only at the beginning of introducing perennial flowering plants in the design of these types of green spaces, as there are no studies on species that are resistant to the level of pollution and environmental conditions of this city. This paper discusses the impact of perennial flowering plants in urban landscaping in Bucharest, in heavily trafficked road and pedestrian areas, presenting both the problems encountered and the good things about the landscaping choices made by the municipality. At the same time, the paper aims to demonstrate the need for the involvement of the municipality and the specialist community in carrying out comprehensive studies on the resilience of perennial flowering plants in the current urban space of Bucharest, as on their use.

Key words: Bucharest, perennial flower plants, urban green spaces, urban landscape.

INTRODUCTION

"Landscaping a green space is not about filling the empty spaces between buildings with stones, grass, flowers and trees, but about organizing, harmonizing and disciplining plant forms, the dynamic chromatics of flowers and leaves, the mobility of water, the textural contrast of surfaces and relief with different buildings or amenities."

For each individual, depending on the type of viewer (resident or tourist, intellectual or worker, old or young, parent or child), the perception and experience of the urban space in which they live is different. Contemporary civilization is basically defined by the evolution, dynamics and development of cities. Important elements of urban space include landscaping. Of these landscapes, squares, flowerbeds and green pills are the most common, the most numerous and the most exposed to road and pedestrian traffic and high thermal radiation in summer. Due to the polluted environment (air and soil), these types of landscaping have a greater and more sensitive degree of difficulty in their design, raising problems in maintenance work as well. In these types of urban spaces, from an

aesthetic point of view, flowers contribute to satisfying people's need for beauty, as their colors have a beneficial psychological influence on us.

The paper presents a visual analysis of the impact of perennial flowering plants used in the above-mentioned types of urban development in Bucharest.

The study is important in order to establish a support (technical, aesthetic and ecological) for this type of landscaping.

It should be noted that there is currently no study on perennial flowering plants in this respect (studies of resistance to environmental factors, principles of arrangement and maintenance, etc.) in the urban environment of Bucharest. Thus, the urban landscaping with perennial flowering plants that I will be analyzing has been carried out over the last 10 years by the local authorities of Bucharest without any specialized studies.

MATERIALS AND METHODS

1) University Square (Piața Universității) is a very important area of the capital from several points of view (urban, architectural, cultural, historical, social, tourist, etc.) located

right in the center of the capital, at the intersection of Regina Elisabeta, Nicolae Bălcescu, Carol I and Ion C. Brătianu boulevards, creating the north-south and east-west axes. The shape of the intersection is of Parisian influence after the Haussmannian model of the "Grand-Intersection" (La Grande Croisee). At the same time, this intersection is home to several buildings of great architectural value of important institutions such as the University of Bucharest, the hotel Grand Hotel Bucharest (former Intercontinental), National Theatre "I. L. Caragiale" Bucharest, the Ministry of Agriculture and Rural Development, Colțea Clinical Hospital and the Museum of Bucharest. It is an intersection located in the Protected Area no. 4 - Magheru - Brătianu, with very intense traffic both by road and by pedestrian and represents one of the main emblems of the capital, thus becoming a much-visited area by tourists. In this context, the aesthetic function of the layout of the squares formed at this intersection is of high importance (Figure 1).

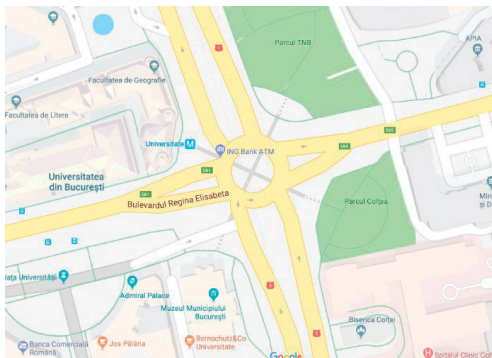


Figure 1. University Square, map - retrieved from Google Maps (image source: <https://www.google.ro/maps/@44.4357114,26.1027727,18.5z?hl=ro>)

On these squares the municipality has realized in 2013-2014 round groups formed by: *Yucca filamentosa*, *Juniperus horizontalis* interspersed with bulbs of *Tulipa* sp., *Rosa ground cover* interspersed with bulbs of *Tulipa* sp., *Miscanthus sinensis*, *Kniphofia uvaria* without circle formed by *Aquilegia vulgaris*, round in which they have placed centrally a species of *Catalpa bignonioides* Nana. These circles are linked by groups of plants, without a clear geometric shape but sinuous, consisting of *Berberis thunbergii* interspersed with bulbs of

Tulipa sp. and *Leucanthemum vulgare* interspersed with *Berberis thunbergii* and surrounded by turf (Figures 2-6).



Figure 2. University Square, view towards the central square (date image taken: 27.06.2017)



Figure 3. University Square, view towards Queen Elisabeth Boulevard (image capture date: 27.06.2017)



Figure 4. University Square, view towards Ion C. Brătianu Boulevard (date image taken: 27.06.2017)



Figure 5. University Square, view from the square on Ion C. Brătianu Boulevard (date image taken: 27.06.2017)



Figure 6. University Square, overlooking the National Theatre "I. L. Caragiale" Bucharest (date image taken: 27.06.2017)



Figure 8. Charles de Gaulle Square, view from the square on Aviatorilor Boulevard (date image taken: 23.07.2017)

All areas are sprinkler irrigated.

2) **Charles de Gaulle Square** is another important intersection in the capital, linking the northern exit of the city to the main boulevards leading to the city center (Figure 7) and is part of the Protected Area 14 - Aviators.



Figure 7. Charles de Gaulle Square, map - retrieved from Google Maps (image source: <https://www.google.ro/maps/@44.4658748,26.0866541,18z?hl=ro>)



Figure 9. Charles de Gaulle Square, view from the square on Aviatorilor Boulevard (date image taken: 23.07.2017)

This intersection "underwent" a big change of image with the redevelopment of the intersection in 2015 by the local authorities, and the creation of a more vertical concept in terms of image than the previous one and more abundant in terms of the multitude of species planted. Basically, the squares formed in this intersection, were landscaped with massive and dense groups of trees (*Salix* sp.) with various species of shrubs and perennial flowering plants such as *Rudbeckia fulgida*, *Iris* sp., *Lavandula* sp., *Coreopsis* sp., *Achillea millefolium*, various decorative grasses, etc. (Figures 8-12).



Figure 10. Charles de Gaulle Square, view towards the central square from Mareşal Constantin Prezan Boulevard (date image taken: 23.07.2017)



Figure 11. Charles de Gaulle Square, view towards the central square from Aviatorilor Boulevard - entrance area (date image taken: 23.07.2017)



Figure 12. Charles de Gaulle Square, view towards the square in the area of Spring Avenue (date image taken: 23.07.2017)

The irrigation system is combined: sprinkler irrigation for lawn areas and surface drip irrigation for areas with groups of plants.

3) Unirii Boulevard (Bulevardul Unirii) - the section between Unirii Square and Alba Iulia Square (Figure 13), is a wide artery with green spaces such as green flatbeds running along the entire length of the boulevard both on its sides and on the central axis.

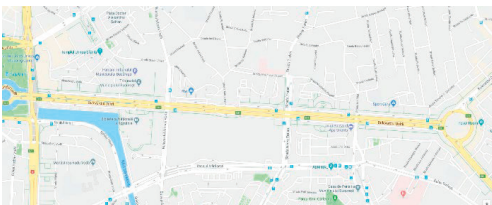


Figure 13. Unirii Boulevard, map - retrieved from Google Maps (image source: <https://www.google.ro/maps/@44.425593,26.1167538,15.58z?hl=ro>)

The existing vegetation on the central plateau was enriched, in 2014, by planting species of roses that bloom throughout the warm season (Figure 14). The end of this plateau facing Alba Iulia Square was landscaped with annual floral

"spots" (*Begonia semperflorens* Rouge/Red) (Figure 16).

The sidewalks (two on each side) were altered in terms of terrain by creating a slope with a slope running down to the street for the street ones, which were also planted with clusters of roses. In areas with intersections, and interior promenade areas, the flatbeds were transformed into large planters by building enclosed retaining walls around them and raising the ground level by 40-50 cm. Among the existing trees, plant clusters were created consisting of dwarf shrubs decorative by foliage such as *Euonymus fortunei*, *Berberis thunbergii*, *Atropurpurea* and *Juniperus horizontalis* and perennial flowering plants such as *Lavandula* sp., also a decorative species and by foliage (Figures 14-15).



Figure 14. Unirii Boulevard, view towards the central and side street (date image taken: 30.09.2016)



Figure 15. Unirii Boulevard, view to the sidewalk promenade (date image taken: 30.09.2016)



Figure 16. Unirii Boulevard, view towards the central platform - end of Alba Iulia Square area (date image taken: 30.09.2016)

At this location, the irrigation system is also combined: sprinkler irrigation for the lawn areas and surface drip irrigation for the cluster areas.

RESULTS AND DISCUSSIONS

1) By analyzing the first area, **University Square**, we discover an urban development with many problems from many points of view. For 70% of passers-by (according to the survey conducted on a sample of 100 people divided into four age categories and categories of pedestrians and drivers), from an aesthetic point of view, the landscaping tends to go unnoticed and indifferent to the viewer's eyes. It does not attract attention, is pleasing to an average level and does not disturb the eye. Compositionally it is a rather monotonous arrangement with few accents due to the flowering periods, which are short and unbalanced.

Due to inadequate maintenance of these species (such as: sprinkler irrigation and inadequate water quantity, lack of regular fertilization, lack of species-specific and regular maintenance work - pruning, dry cleaning, weeding, etc.), the plants have developmental problems (Figures 17-21). Because of these developmental problems, a correct assessment of these perennials in terms of resistance to environmental and pollution factors is compromised. Thus, the rondo formed by *Kniphofia uvaria* with an outer circle of *Aquilegia vulgaris*, has completely dried out, and since 2019 annual flowers have been planted on its surface (Figure 22). At the same time, the free areas remaining after the drying of some *Yucca filamentosa* specimens, as well as some shrubs in the arrangement were filled with annual flowering plants (Figures 23-24).



Figure 17. University Square, *Kniphofia uvaria* with outer circle of *Aquilegia vulgaris* (date image taken: 27.06.2017)



Figure 18. University Square, *Leucanthemum vulgare* (date image taken: 27.06.2017)



Figure 19. University Square, *Yucca filamentosa* - water regime problems (date image taken: 27.06.2017)



Figure 20. University Square, *Rosa* ground cover interspersed/strewn with bulbs of *Tulipa* sp. (date taken image: 27.06.2017)

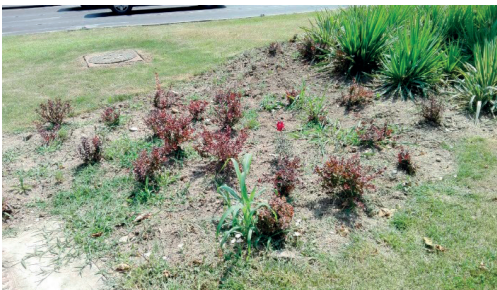


Figure 21. University Square, *Berberis thumbergii* interspersed/interspersed with bulbs of *Tulipa* sp. (date taken image: 27.06.2017)



Figure 22. University Square, former round of *Kniphofia uvaria* and *Aquilegia vulgaris* - replanted with annual flowers (date image taken: 09.2022)



Figure 23. University Square, round with *Yucca filamentosa* - completed with annual flowers (date image taken: 08.2019)



Figure 24. University Square, areas with shrubs - completed with annual flowers (date taken picture: 10.2022)

The only species less affected by poor maintenance, and which has shown good resistance over time to urban pollution, is *Miscanthus sinensis*, which has been growing well over the years, with a pleasant and decorative appearance, only in the last 2 years some specimens have dried out (Figures 22 and 25).



Figure 25. University Square, round decompleted with *Miscanthus sinensis* (date image taken: 10.2021)

In the second half of 2019, the entire landscaping of the central square of the intersection, including the areas with

Miscanthus sinensis, was dismantled for the construction of the Ion Constantin Brătianu monument. This aspect is of importance in the analysis of the evolution and development of *Miscanthus sinensis* specimens, because by shrinking the sample the analysis and conclusions were affected.

From the pavement, at a distance of at least 10m from the analyzed squares, practically from the pedestrian viewer's point of view, these plant problems cannot be observed. Visually, it is just an overview that can be more colorful or bland depending on the season, with areas with small gaps depending on the specimens dried and removed from the group.

2) Compared to University Square, the landscaping of **Charles de Gaulle Square** creates an extremely strong visual impact on passers-by, but not in a good way.

For 85% of passers-by in this area (according to a survey of 100 people divided into four age groups and categories of pedestrians and drivers), from an aesthetic point of view, the landscaping creates a "wild" image, influencing passers-by's perception of the space and creating a general feeling of discomfort. The majority of interviewees stated that they felt as if they were in the "delta".

Drivers, especially those who do not live in Bucharest and those who have to cross this intersection for the first time or very rarely and do not know the area well, can no longer visually navigate the intersection due to the tall and abundant vegetation - creating a feeling of disorientation in space.

The only species of perennial flowering plants that can be seen and admired by passers-by are the few specimens planted in the small, triangular squares formed at pedestrian crossings. Several hundred more perennial flowering plants have been planted in the plant clusters created. These, due to the planting position and the mixtures made with the shrub species, were almost visually obliterated. The only species that managed to stand out and provide a splash of accent and color to the arrangement was *Rudbeckia fulgida*.

In general, the chosen species have a good resistance to urban environmental factors. But the choice of more water-loving species, combined with species that prefer a different

water regime, and their planting in an intersection, which in the hot season turns into a real "radiation furnace", has created various types of development problems for the planted species. Some of these problems are: harbor depreciation, suffocation, drying out of some specimens until the disappearance of some species from the arrangement. Among the most affected perennial flower species are *Iris* sp., *Achillea* sp., *Coreopsis* sp., *Rudbeckia* sp. (Figure 26), and among the most resistant species are decorative grasses (Figure 27) and *Lavandula* sp. (Figure 28).



Figure 26. Charles de Gaulle Square, *Coreopsis* sp. (date taken image: 23.07.2017)



Figure 27. Charles de Gaulle Square, decorative grasses. (date taken picture: 09.2022)



Figure 28. Charles de Gaulle Square, *Lavandula* sp. (date taken picture: 09.2022)

3) The improvement of **Unirii Boulevard** (the section between Unirii Square and Alba Iulia Square), carried out in 2014, has a positive impact on passers-by.

For 75% of passers-by in this area (according to a survey of 100 people divided into four age groups and categories of pedestrians and drivers), from an aesthetic point of view, the landscaping creates a pleasant and modern image.

The composition of the plant groups is balanced. Each species is visible, harmonizing with adjacent species and highlighting each other through the color of their habit.

As well as roses, passers-by were delighted to recognize lavender plants.

The whole arrangement is well maintained, with all pruning and cleaning work carried out at the required times, always giving a well-groomed appearance.

From a driver's perspective, the landscaping creates a pleasant environment and there are no elements of it to disturb the smooth flow of traffic.

A negative and important mention of this development is that by elevating the land, existing mature trees have been affected. The newly added topsoil has surrounded their stem to a height of 40-50cm. This layer prevents the roots of the trees from breathing and maintains continuous moisture directly on the bark, which in time leads to rotting and facilitates the attack of diseases and pests on the trees. In practice, this over-elevation of the soil affects the biology of the trees, the effects of which can be observed over time (Figure 29).

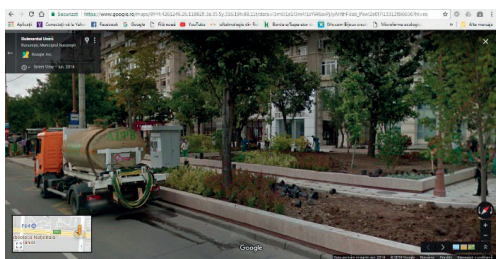


Figure 29. Unirii Boulevard, elevation of the sidewalks - Google Maps (image source: https://www.google.ro/maps/@44.4261246,26.118829,3a,75y,325.48h,99.22t/data=!3m6!1e1!3m4!1sYW6avPjJyAHthFiJab_Pkw!2e0!7i13312!8i6656?hl=ro)

The municipality has chosen to use only one species of perennial flowering plant (*Lavandula* sp.) in the landscaping solution. The large surface area of these street beds, which are approximately 2 km long, offers the opportunity to landscape them with a much wider range of perennial flowering plant species. By using these, the plant base would be enriched and ecological and aesthetic diversity would be created.

CONCLUSIONS

These three areas analyzed are among the first major urban landscaping projects in Bucharest, where the municipality used perennial flowering plants in their landscaping.

The dates (years) of the creation of these landscapes are important in analyzing the resistance of the perennial flower species used to urban environmental factors.

Visual analysis over time has shown that the main factors contributing to the degradation of the landscapes are the way they are laid out, the species association and inadequate maintenance.

Given the number and size of urban green spaces throughout the capital, the use of these types of plants would require the municipality to invest in sustainable landscaping, whereby the maintenance costs would be much lower than the maintenance needs of lawns and annual flowering plants. In addition, the use of perennial flowering plants in the landscaping of urban green spaces in Bucharest means enriching the plant base and its biodiversity, aspects that contribute to improving environmental factors and quality of life.

In order to achieve such landscaping with perennial flowering plants in an efficient, economical and aesthetically balanced/harmonized way, it is necessary that both the municipality and the specialist community engage in comprehensive studies on the resilience of perennial flowering plants in the current urban space of Bucharest and on their use. These studies should result in a "regulation"/"catalog" that provides for perennial flowering plant species resistant to the urban environments and pollution factors of Bucharest. At the same time, the species should be organized by ecological needs (light, water

regime), flowering periods, colors, height regime, foliage type, bush diameters, and any other necessary elements identified. Such a system of organization of perennials can contribute positively to the choice of appropriate species in the landscaping of urban green spaces in Bucharest.

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