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Editorial: Methods and protocols in floriculture and landscapes

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Editorial on the Research Topic
Methods and protocols in floriculture and landscapes

1 Introduction

Innovative technologies and methodologies should be utilized to mitigate errors in the floriculture and landscape sectors. The planning and design of urban and peri-urban green spaces necessitate careful consideration of various factors, including climatic and agronomic conditions, the botanical and eco-physiological characteristics of ornamental plants, and the interactions between infrastructure and green elements. These green areas, due to their plant composition, play a crucial role in providing essential ecosystem services within urban environments.

2 Design and planning of green spaces

The process of designing and planning green spaces is a complex, multidisciplinary endeavor that involves professionals such as landscape architects, planners, agronomists, botanists, hydrologists, and civil engineers (Burlando et al.). The initial steps include evaluating the area and its location while prioritizing environmental and municipal constraints in the analysis. The selection of plants is significantly influenced by soil and climate parameters. Where the area is already green, a thorough assessment of each existing plant is essential to determine whether its preservation or replacement is more appropriate. Upon completing the site analysis, the design of the future green space must consider its environmental and social functions, potential ecosystem services, its role within the broader context, compositional aspects, and the careful selection of plant species and materials. The study by Burlando et al. proposes a working method that is both multidisciplinary and multiscale, aiming to create sustainable and effective green spaces that thrive even in challenging conditions associated with human impact and climate change.

The quality of ornamental plants in urban areas is determined in nurseries. Stem-cutting propagation and inadequate rooting efficiency continue to pose economic challenges for the ornamental nursery industry. Indole-3-butyric acid (IBA) and naphthaleneacetic acid (NAA) are

auxins that induce adventitious root formation when applied exogenously. In urban or peri-urban environments, the use of chemical inputs—including not only pesticides, which are generally prohibited except for limited exemptions, but also all other synthetic products—should be replaced with natural, eco-friendly alternatives. Biostimulants present a potential solution to mitigate the risks associated with agrochemical use, as they are generally regarded as non-toxic, non-polluting, biodegradable, and non-hazardous (Toscano et al., 2018). The application of seaweed-based biostimulants to ornamental stem cuttings enhances root formation in terms of rooting percentage, root number, and root architecture. Furthermore, these biostimulants improve the overall quality of rooted cuttings, as evidenced by increased dry biomass and organic compound content. A study on seaweed-based biostimulants, particularly those derived from brown algae, such as Goteo®, Kelpak®, AlgaminoPlant, Bio Rhizotonic, and Actiwawe, was conducted. The applied protocols, detailing dosage, application methods, number of treatments, and types of cuttings, are described, and their effects on rooting rates, root architecture, and overall quality of rooted cuttings have been reported. The application of commercial biostimulants has been studied across various plant species, cuttings, locations, raw materials, compositions, dosages, number of applications, and growth environments to determine sustainable propagation protocols (Loconsole et al.).

Urban green spaces are essential components of urban environments, significantly enhancing the quality of life by providing various ecosystem services. These areas require careful design and management with a long-term perspective to ensure a sustainable urban ecosystem. In the United States and Canada, the Urban Forest Management Plan serves as a valuable tool for this purpose. Practical and effective management plans for public urban green spaces in Europe have been described during a non-routine period to inform the development of comprehensive management strategies. The study conducted by Battisti et al. aimed to explore the knowledge base available to European municipalities for establishing urban green management plans. The findings are presented as an initial guide primarily targeting public administrators, offering a framework and methodology for structuring long-term green management plans in European cities. In anticipation of European municipalities adopting such long-term strategies, a framework comprising five essential elements—long-term vision, maintenance, research funding, participatory processes, and ecosystem services—has been proposed to achieve this objective.

Plants are a fundamental component of living walls; however, their role in this context has received limited attention. Living walls represent a form of urban green infrastructure with the potential to address challenges associated with urbanization, such as the urban heat island effect. A three-year study conducted in a temperate oceanic climate in southwestern Germany examined plant development within textile-based living walls (mats) (Stollberg and von Birgelen). The objective was to enhance the diversity of plants involved in living walls. The study focused on 34 perennial species, including shrubs, ferns, grasses, and geophytes, which require high soil moisture. The mats were devoid of soil and necessitated overwatering with a nutrient solution. The perennials were categorized into two plant modules: "cascade" (tall, hanging plants) and "ground cover" (low-spreading plants). Four experimental walls were oriented to the south, north, west, and east, adapting the plant modules to the specific lighting conditions of each wall. The modules were pre-cultivated and fixed to the experimental walls in a randomized design. The visual attractiveness and additional parameters of individual plants were assessed. *Tellima grandiflora* 'Rubra', *Waldsteinia ternata*, *Pachysandra terminalis*, and *Heuchera* 'Purple Petticoats' were identified as the most visually appealing species. *Ajuga tenorii* 'Mauro', *Alchemilla caucasica*, *Hosta sieboldii* 'Harry van Trier', *Glechoma hederacea*, and *Geum coccineum* 'Carlskaer' exhibited notable ornamental effects and flowering during the summer. The ferns and *W. ternata* demonstrated delayed growth but gradually developed an appealing leaf texture.

3 Natural-based solutions

The reduction of agrochemicals in urban areas can be achieved by utilizing appropriate plant species. Marigold (*Tagetes erecta* L.), a popular ornamental plant belonging to the Asteraceae family, is widely cultivated in many countries for its decorative flowers. These plants thrive in a variety of soil and climatic conditions and have been shown to reduce soil nematode populations while indirectly controlling harmful microbes. High-performance thin-layer chromatography has been used to identify several important biologically active compounds in the flowers and leaves of two marigold cultivars, 'Pusa Narangi Gainda' and 'Pusa Basanti Gainda.' The compounds identified included gallic acid, caffeic acid, quercetin, p-coumaric acid, and kaempferol. Results indicated a higher concentration of compounds in the leaves compared to the flowers, with 'Pusa Narangi Gainda' accumulating a greater variety of compounds than 'Pusa Basanti Gainda'. Gallic acid was present in both the leaves and flowers of both cultivars, with the highest concentration found in the flowers of 'Pusa Basanti Gainda'. Caffeic acid and quercetin were detected in leaves of both cultivars, while p-coumaric acid was found exclusively in the leaves and kaempferol only in the flowers of 'Pusa Narangi Gainda'. These findings presented in this report may be effectively utilized to advance research on marigolds as a natural source of antioxidants and biological control agents for practical applications (Mir et al.).

In conclusion, by adopting thoughtful, science-based methods and well-structured management protocols, we have the opportunity not only to enhance the ecological and social quality of green spaces, but also to significantly reduce long-term maintenance costs—demonstrating that sustainability and efficiency can go hand in hand in shaping healthier, more resilient urban landscapes.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Reference

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