



Studies on vertical gardening practices and their future perspectives

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Abstract

The study looks at the vertical gardening phenomena. The authors analyze the difficulties, potential and opportunities for exploiting the hard climate of this form of horticulture. In metropolitan areas and in private and public locations, vertical gardening is granted. The main challenges in vertical gardening have been established: a difficult climate, designers must adapt existing global methods to local weather conditions; the use of plants that are not acclimated; expensive local planting material; lack of interest in enhancing the city's government's structures. This development is very promising: use of local endemic flora; the use of upright gardens to create a topiary; decoration of building facades and storage walls with annual plants; the use of vertical indoor gardening. The development of this region is particularly promising: It has been determined that extensive research by biologists, theoretical designers and designers are necessary in order to develop this approach, in order to produce a broad idea of landscape design and improvements in different areas.

Keywords: vertical gardening, landscape design, horticulture

Introduction

Vertical gardens are one of the significant techniques to decorate with live plants structures, buildings and their interiors. Due to the excellent mix of utility, ecological and aesthetic qualities, this form of landscape is given special attention in metropolitan areas. Technical equipment is continually renovated for vertical landscaping systems. Worldwide, landscape designers do scientific study and practical actions to pick plants, develop designs and technology. The Vladivostok and Primorsky territories demonstrate this trend. Vertical gardening is an interest of theorists and professionals in architecture and landscape design. Some of the application possibilities are represented in Vladivostok's Improvement Rules. In Russian and foreign books for designers' practice, vertical gardening problems are most frequently discussed. Modern scientists reveal some characteristics of this phenomena and do not try to examine it in detail. The investigators therefore aim to identify the varieties of vertical landscaping by their purposes (Chernova, Fedorovskaya, & Petukhov, 2020) ^[3] by examining vertical gardens from the perspective of their layout, maintenance, material cost, and components (Sergeeva, Kovalev, & Golotina, 2020) ^[11].

There is also the potential to use vertical gardening as an anesthetics for artificial vertical and inclined walls for designing facades and the towns of buildings (Abdullah, Rosnan, & Yusof, 2018; Chernova *et al.*, 2020) ^[3]. Work has been carried out with techniques for the creation and care of vertical gardening objects, selection of ranges and suggestions for vertical gardening with annual floral urban crops. Studies that describe the characteristics of plants that may be used for vertical gardening and examine the circumstances necessary to sustain their viability are taking place at a particular site (Оплетаетв) and to also explore the potential for plant cultivation on a vertical plane (Vialard & Vialard, 2012) ^[13]. A French researcher and designer Patrick Blank is one of the world's leading players in vertical gardening. He has offered innovative thoughts and

technologies that influenced nearly every current designer to create vertical gardens. The Malaysian architect Ken Yeang is another no less well-known specialist. It is the creator of over 200 construction designs that employ vertical gardening ideas. His thoughts are also taken into account (Jain & Janakiram, 2016) ^[7].

In the inside of residences and public places, researchers explore the principles of vertical gardening, including physical images. In the far eastern of Russia and especially the Primorsky Territory, however, not enough articles are devoted to vertical gardening. G.A. Adamchik's study emphasizes the absence of new tendencies and any growth in Primorsky Territory landscaping, as well as some potential to change the situation by the introduction of this style of landscape (Adamchik, 2013) ^[2]. In a number of proposals on the design of one of Vladivostok's buildings and the transit landscape. It writes about the possibility to decorate with plants that support the walls that are important parts of the urban landscape, G. Oberta, V. V. Petukhov, L.A. Cherniavina has improved aesthetic perception of space (Serebryakov, Obertas, Petukhov, & Chernyavina, 2018) ^[10]. This article evaluates the demand for vertical gardening and analyses the challenges associated with developing this form of gardens in the Primorsky region in Vladivostok (Fell, 2011) ^[4].

Results and Discussion

There are now a variety of vertical gardening methods connected with horizontal planting methods. The first documented kind, called the Babylonian Gardens. This style featured a vertical aesthetic impression, which is connected to four levels of terracing. In the future, comparable buildings were discovered in the Kremlin's famous Riding Gardens, Ancient Rome, Medieval Nuremberg. The roof gardens have a long history as well. Another kind. Worldwide, the "Green Roof" project includes not only technology but also methods for the creation of gardens on the roof. The project is a broad-based one. The project Ken

Yeang creates high-rise structures with a design in eco-design style may be ascribed to this kind. One of the simplest and most popular forms of vertical gardening is the development, with the assistance of creeping plants on a supporting and guiding structure, of a vertical plant composition. We also use different methods as supports and guidance frames to refer to the same sort as gardening of trees. The structure's height may exceed 25 meters in height. The next type of vertical gardening was the installation of balcony cases and seedlings with the same flower culture of the same structure. This kind is one way of decorating building façades in vertical gardening. In topiary gardening vertical gardening components are used. The development of contemporary art has led to the building of enormous, vertically read compositions of many plants of one or more different species. For gardening the volumetric values employing annuals, vertical structures also apply.

One of the most promising themes for environmental design was the Vertical Gardens proposal by botanist and French designer Patrick Blanc. Vertical gardens are the idea that horizontal landscaping methods are transferred to vertical in relation to the possibility of developing a few herbaceous, woody plants that are of modest growth without finding a root system in the soil. Such plants are not primarily horizontal and may grow on any surfaces. The Vertical Garden System, is patented. The essential concepts and the techniques for the building and design of vertical gardens that are important for most vertical gardening. It has a layered construction based on small components and a system of hydroponic plant food, so that the nutrients can be abandoned. The system with plants therefore has a low weight of no more than 30 kg per 1 sq.m. This prevents undue burden and eliminates the deterioration of structures on the walls (Salas *et al.*, 2010) ^[9]. A review of the sources, together with personal observations of the authors, revealed this article that a careful selection of plant material is required to successfully construct the composition in the Vertical Garden System designs:

- Use mostly indigenous species and acclimatized plants in exceptional instances;
- Use long-lived plants - not advised annual plants.
- Plants should be chosen on the basis of coexisting qualities. Sun-loving plants are therefore positioned above the tolerable shade. The aggressiveness of the plant with respect to other botanical species must be taken into account.
- Plants without a central stem are chosen that are independent of gravity due to their near relative location in the composition.

Plants produce a solid arrangement based on their bright and beautiful features. The designer's décor matches or conflicts with the architectural style. The proposal of Patrick Blanc therefore demonstrates a quality new approach to the creative elements of the flora-decorated vertical surface. Viewing the phrase "vertical gardening" remains conventional and shows how living plants are placed on vertical surfaces. The phrase "vertical gardens" is used to indicate the figurative and artistic content of plants in the arrangement. The Patrick Blanc approach is being shifted from landscape and urban area to interior designers of modern interior design. A panel is used for zoning and decoration of live plants, phytowalls or living walls. Thus, vertical landscaping exists of various kinds. Most of them

may be utilized in or to some extent already used in Vladivostok's urban space and interior (Sahu & Sahu, 2014; Utami & Jayadi, 2011) ^[8].

Perspectives

In the external environment, we will explore several potential options, despite the fact that using the vertical planting creates apparent problems. New structures according to the idea of the point are being erected in the historic heart of the city. The resulting destruction of leisure spaces, squares and parks has a severe effect on the city's environment. We believe it might be possible to greatly enhance the ecology and look of urban facilities by developing various kinds of vertical gardening in the city, which do not occupy an area that is important. Different places also have a distinct uniqueness of botanical species that permit the introduction into urban objects of indigenous natural flora. For instance O. V. Khrapko, A. V., Kop'yeva, O. G. Ivanova (Hrapko, Kop'yova, & Ivanova, 2015) ^[5] innovations are present. The Regulation of vertical and roof gardening is in place in different areas. It has been proven that under these climatic circumstances the potential of vertical planting is restricted to three levels. Moreover, "these buildings and constructions feature facades or large plans without opening of exterior walls". Currently, research studies and practical trials in various areas are essential for the realization of ideas for vertical gardens in the town of Vladivostok (Ivanova, Ganzha, & Podkovyrov, 2020) ^[6]. The plants for future vertical gardens need to be examined and selected which are resistant to excessive insolation and salinization, strong breeze winds and southern temperature fluctuations. We need to investigate promising introductory like mosses and ferns. Projects of partial façade landscaping on the basis of a vertical garden system must be carried out with the monitoring of inhabitants and visitors' condition and reception of the subject. Search for possibilities to enhance the system for vertical gardening in order to nourish and maintain the appropriate temperature for plant life, especially for heating the system in a cold season. It is important to find ways to build compositions using detachable modules cleaned during the cold season. In particular, G.A. Adamchik writes on this. Research and experimentation on incorporation of already tested and novel forms in the city's visual image becomes significant under the climatic circumstances of the city of Vladivostok. For example, the construction of major topical figures, floral and yearly sculptures. These buildings can be continuously built and covered during the cold time with shields or ornamental coverings. In Vladivostok city and neighboring towns in Primorsky territory, such things have emerged several times. But no systematic work is being done in that direction. Simple numbers from annuals can be one of the steps to build cheap vertical gardening technology in Vladivostok. Begonias, viola, coleus are recommended for this purpose. These plants are light-saturated and climate-friendly.

Partial design of façades and walls of indigenous vines appears promising. We are able to observe lianas on the main facade of the Russian Academy of Sciences Botanical Garden Institute Far East. The retaining walls of the City are additionally decorated with annual and permanent plants in order to be integrated into the architectural complex of the city and to enhance the environment. The formation of this type of design in higher education institutions of different

territories within "Design," "Design of the Architectural Environment," "Landscape Architecture" training directions are a positive role in stimulating scientific research and creation of urban and interior vertical projects for gardens. In the inside of public and residential buildings it appears promising to utilize vertical gardening components. Representatives of the Russian producer of vertical gardening unusual watering modules operate in the city of Vladivostok for a number of years. The "Vertical Healing Gardens" firm, for instance; Alivotec's eco-wall modules are also available.

This enables vertical gardens to be developed as a direction. For example, consider the "BIBILOK" project firm, the "Vertical Healing Gardens" distributor. Note that in Vladivostok planting material is much higher than in other places. The low frequency of live plants in both public and private places in the town may be determined by expensive prices. There are, however, few federally funded objects in the city. For example: "Tropical Rain Forest." This is now one of Vladivostok's most stunning and large-scale instances of vertical gardening. We can observe that this design is stylistically homogeneous and compositional.

Conclusion

The new methods to vertical gardening in the globe are therefore designed to increase the focus on the aesthetic function of such initiatives. In the architectural ensemble, the vertical composition should be expressive and creative; it should perform a certain role. Situated in an area in which single, indigenous species flourish, this is a distinct style. This allows you to look for new forms and practices tailored to local weather circumstances. These renovations should be supplemented by several vertical gardening things using diverse sorts, forms, and ornamental features of plants. Comprehensive investigations are needed for this by biologists, theoretical designers and practical designers. It aims to establish an overall idea of the vertical gardening kind landscapes.

References

1. Abdullah NC, Rosnan H, Yusof N. Internationalisation of Hospitals in the Wake of Green Agenda: How much more to be done. *Environment-Behaviour Proceedings Journal*,2018;3(7):161-166.
2. Adamchik G. Prospects of application of vertical gardening in the conditions of the city of Vladivostok. *Vestnik of engineering school of FEFU*,2013;3(16):98-109.
3. Chernova A, Fedorovskaya N, Petukhov V. Problems and Perspective of Vertical Gardening in the Vladivostok Design. Paper presented at the IOP Conference Series: Materials Science and Engineering, 2020.
4. Fell D. Vertical gardening: grow up, not out, for more vegetables and flowers in much less space: *Rodale*, 2011.
5. Hrapko O, Kop'yova A, Ivanova O. Natural accent in urban gardening. *Modern problems of science and education*,2015;61(5):689-695.
6. Ivanova N, Ganzha O, Podkovyrov I. Basic methodology in construction of vertical gardening of a building. Paper presented at the *Journal of Physics: Conference Series*, 2020.
7. Jain R, Janakiram T. Vertical gardening: A new concept

- of modern era. *Commercial Horticulture*. New Delhi, India: New India Publishing Agency, 2016, 527-536.
8. Sahu K, Sahu M. Vertical gardening: for present age environmental protection. *Recent Research in Science and Technology*,2014;6(1):236-237.
 9. Salas M, Verdejo M, Sánchez A, Guzmán M, Valenzuela J, Montero J. Vertical gardening. Adaptation of hydroponic systems and ornamental species. Paper presented at the XXVIII International Horticultural Congress on Science and Horticulture for People (IHC2010): International Symposium on, 2010, 937.
 10. Serebryakov S, Obertas O, Petukhov V, Chernyavina L. Retaining wall as an object of monumental art in the urban environment. *Modern science-intensive technologies*,2018;9:109-114.
 11. Sergeeva N, Kovalev R, Golotina I. research of the problem of applying technologies of vertical gardening on the designs of translucent building envelopes. *международный научно-исследовательский журнал*(6 (96) часть 1), 2020, 173-179.
 12. Utami S, Jayadi R. Vertical gardening for vegetables. Paper presented at the I International Symposium on Sustainable Vegetable Production in Southeast Asia, 2011, 958.
 13. Vialard N, Vialard M. Gardening Vertically: 24 Ideas for Creating Your Own Green Walls: WW Norton, 2012.
 14. Оплетаев А. ФГБОУ ВО «Уральский государственный лесотехнический университет», 620100, Россия, Екатеринбург, ул. Сибирский тракт, д.37opletaev.ekb@ yandex.ru, 2012.