



## Vertical Gardening as a Tool for Urban Greening Using Ornamentals

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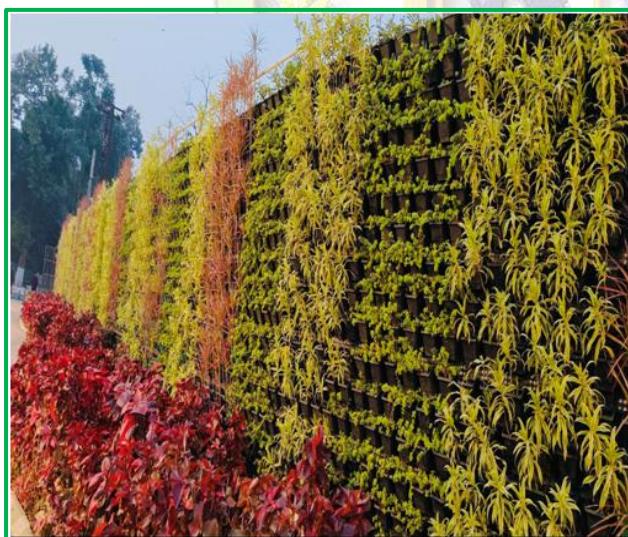
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Vertical gardening is a modern urban gardening technique ideal for limited spaces, utilizing walls, roofs and vertical surfaces. Also known as Green Walls or Living Walls, vertical gardening was first invented by Stanley Hart White (1938). Patrick Blanc is recognized as the Father of Modern Vertical Gardening (1980s–1990s). Rapid urbanization has reduced open green areas, making vertical gardening an effective tool for urban greening. This article discusses the concept, benefits, types, plant selection, methodology, results and conclusions related to vertical gardening using ornamental plants.

### Introduction

Vertical gardening is a modern urban gardening technique ideal for limited spaces, utilizing walls, roofs and vertical surfaces. Also known as Green Walls or Living Walls. Vertical garden was first invented by Stanley Hart White (1938). Patrick Blanc is recognized as the Father of Modern Vertical Gardening (1980s–1990s). It offers an alternative to horizontal gardening by efficiently expanding plant growth into vertical space. Rapid urbanization has reduced open green areas, making vertical gardening an effective tool for urban greening.



### Benefits of Vertical Gardening

1. Adds aesthetic value
2. Acts as natural insulation for hot and cold air and saves energy for buildings
3. Reduces CO<sub>2</sub> levels and increases O<sub>2</sub>, improving air quality
4. Indoor plants act as agents in deterioration of gaseous pollution
5. Prevents dust and harmful micro-organisms
6. Provides thermal impacts through vertical greenery systems

7. Live plants decrease stress levels and create a peaceful ambiance
8. Mitigates the Urban Heat Island effect
9. Conserves water and requires less watering effort
10. Decreases noise levels

## Types of Vertical Gardening

1. Green Facades
2. Living Walls

### Green Facades

A green facade is a vertical planting system where climbing plants grow along walls or supporting structures. In green facades, the growing medium is provided only at the base of the wall. Climbing plants receive water and nutrients from the ground. They consist of climbing plants growing directly on walls or on specially designed supporting structures. Plants can be supported by cables, trellises or other frameworks.

### Living Walls

A living wall is a vertical planting system where pre-vegetated panels, modules or planted blankets are fixed to a wall or frame. These are made from materials like plastic, polystyrene, fabric, clay, metal or concrete, often with an automated watering and nutrient system.

## Ornamentals Used

*Alternanthera sp., Nephrolepis sp., Selaginella sp., Wedelia sp., Peperomia sp., Syngonium sp., Philodendron sp., Epipremnum sp., Anthurium sp., Tradescantia zebrina, Chlorophytum sp., Pilea sp., Rhei discolor.*

## Classification of Ornamentals

### Based on pH

Acid loving: *Ferns, Anthurium, Begonia, Azalea*

Neutral: *Pothos, Spider plant*

Alkaline tolerant: *Petunia, Geranium, Portulaca, Lantana, Kalanchoe, Bougainvillea*

### Indoor / Shaded Green Walls

*Peperomia, Fittonia, Syngonium, Philodendron, Rhei discolor, Pilea, Schefflera, Spathiphyllum*

### Outdoor / Exterior Green Walls

*Asparagus, Mentha, Alternanthera, Pilea microphylla, Jade plant, Sedum, Portulaca, Dusty miller, Cuphea*

### Colour-Based Flowering Ornamentals

Purple/Violet: *Viola, Torenia, Petunia*

Yellow/Orange: *Calendula, Lantana, Cosmos, Tagetes, Zinnia, Gazania*

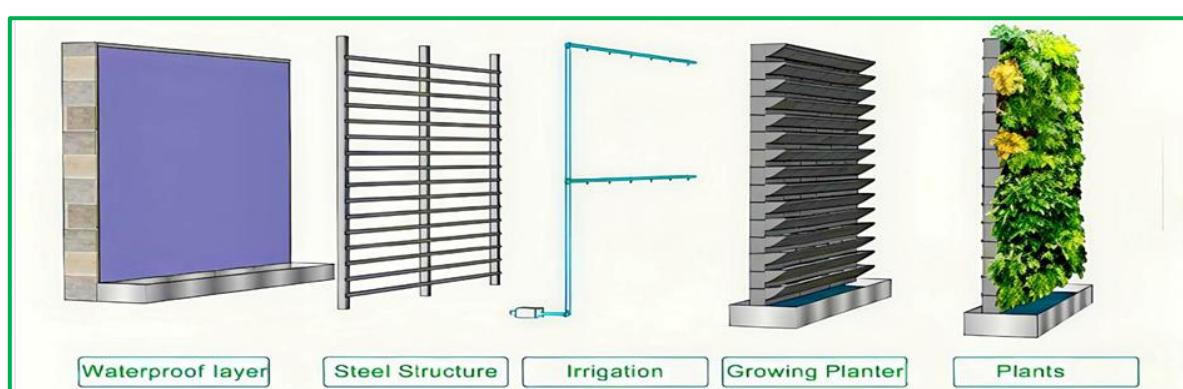
Pink/Rose: *Begonia sp., Zinnia elegans, Portulaca grandiflora*

Violet/Blue: *Viola, Petunia, Torenia*

## Building and Installation of Green Walls

### Structure and Components of Green Walls

Vertical frames, panels and supporting structures form the backbone of green walls.



**Growing Media:** ocopeat, perlite, sphagnum moss, vermiculite, vermicompost, shredded bark and leaf moulds are commonly used.

#### **Media composition:**

40% coconut fibre  
20% multi-purpose soil  
15% compost  
15% fertilizer  
10% vermiculite

**Irrigation and Fertilizer Application:** Drip irrigation and automated fertigation systems are commonly used. Water requirement ranges from 2–5 litres per square metre per day. Nutrients are supplied every 7–10 days using balanced liquid fertilizers or organic nutrient solutions.

**Temperature Requirement:** Vertical gardens perform best at temperatures between 18–30°C. Indoor ornamentals such as ferns and Philodendron prefer cooler conditions, while outdoor plants like Bougainvillea and Portulaca tolerate higher temperatures.

**Disease and Pest Management:** Common diseases include leaf spot, root rot and fungal infections. Management includes proper drainage, avoiding over-irrigation and removal of infected parts. Bio-fungicides such as Trichoderma are effective. Common pests include aphids, mealybugs, spider mites and whiteflies, controlled using neem oil or soap solutions.

## **Result & Discussion**

Vertical gardening systems significantly improve urban microclimate by reducing ambient temperature and enhancing air quality. Ornamental plants add visual appeal and provide ecological benefits such as carbon dioxide absorption, oxygen release, dust trapping and noise reduction. Modular systems were found to be efficient and easy to maintain.

## **Conclusion**

Vertical gardening is a sustainable and space-efficient approach to urban greening. Proper installation, plant selection, nutrient management and pest control ensure long-term success. The adoption of vertical gardens improves urban environmental quality, energy efficiency and human well-being. Vertical garden systems represent an environmentally sustainable and economically viable urban design technique with great potential to improve community environmental quality, energy efficiency and overall health and wellness.

## **References**

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