

LESSON 1 NATURE AND SCOPE OF VERTICAL GROWING

Vertical growing takes on many different forms including green walls and facades through to productive systems such as those found in hydroponics and vertical farming. Some of these are concerned with aesthetics by beautifying a street or building, others emphasise the health benefits of green spaces like green walls located in and around hospitals and care homes, and there are those which are primarily concerned with making the most use of restricted space to grow food. Whatever the purpose, vertical growing or gardening is now something most people are aware of.

NATURE OF VERTICAL GROWING

When it comes to enhancing buildings with greenery, a distinction is often drawn between green walls and green facades. Here, we'll describe what each of these entails, but the reality is that often these terms are used interchangeably, and many designers and installers of green walls don't make these distinctions. If you think more broadly in terms of vertical growing or vertical gardening, then any means of sustaining plants upwards can be included.

Green Walls

Green walls used to be something of a novelty and perhaps whilst greeted with curiosity, they were often considered to be difficult to install and maintain. With advances in technology and an array of possible installation options, they are more commonplace. In recent times, they are also becoming part of building design

and their many benefits to people and the environment are now recognised.



Mass planting of one species of plant is used to great effect here with a section of wall softened using a large leaved plant.

A green wall is a wall which is totally or partially covered with plants which are growing in soil, or some sort of substrate, which is also incorporated into the wall. Where the growing medium is loose it is housed in some sort of container, like bags, which are fixed directly to the wall, are part of the wall's structure, or which are supported by frameworks which are separate

from the wall but often anchored to it. If a substrate is used it can be in the form of mats (e.g. coir), sheets (e.g. polyurethane), or blocks which are manufactured to size to fit a particular wall. In most situations green walls have some sort of irrigation system hooked up to them since it is difficult to water the plants higher up.



Different layers and textures of plants can be used to create greater depth in a green wall.

Green walls may also be called 'living walls' since the plants are actively growing on the wall. They are also called 'vertical gardens'. However, green walls are not the same thing as vertical farming which is a means of growing produce usually inside a large structure such as a greenhouse or some other building e.g. a disused industrial building. That said, many owners of green walls may choose to include food plants as part of a green wall especially where there is limited space, or no other garden space, to grow fruit and vegetables.

Although most green walls are on the outside of buildings, they can also be on inside walls. The foyers of large hotels, high rise apartments and commercial offices offer potential for these types of inner green walls since they are often spacious and bright which allows good access for maintenance as well as more suitable environmental conditions for plants in the way of better ventilation and natural light.

Suggested Tasks: ▼

Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column. Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.

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Suggested Tasks

Take a walk or drive around your local neighbourhood or your nearest town. Look for examples of green walls. Consider the following:

- Are they aesthetically pleasing?
- Do the plants look healthy?
- Had you noticed them before you went looking for them?

Green Facades

A wall which has climbers growing up it from garden beds or containers at the base of the wall is not strictly speaking a 'green wall' since it is really only using the facade for supporting the upper part of the plant, but when it comes to greening up a garden (or even a part of a town or city) most proponents of green walls would welcome all attempts to provide greenery. Green facades therefore have a large role to play in vertical gardening and offer an opportunity to grow plants in difficult spaces which may otherwise be off-limits. For example, a wall in a narrow alleyway could be made use of without restricting the passage of people or machinery. It can also be used to embellish the walls of a small inner city courtyard without reducing free space.

In other instances, green facades can be created by installing a series of planters set in horizontal levels up the face of a building. These can be placed behind supportive trellis for climbing plants, so that as the climbers grow the wall becomes a mass of green vegetation.

Whilst a green facade typically refers to growing climbers up the face of a wall, it doesn't have to just rely on climbing plants. There are other ways you can complement climbers or other means of making a facade green. For example, espaliered fruit trees or topiary box plants along a house wall, or pencil pines either side of an entrance are some of the different ways you can use vertical gardening techniques to enhance the facades of buildings. In many ways, a green facade created from in-ground plants gives

greater scope than growing plants on walls since you can include trees and climbers with large root systems.

Window boxes, hanging baskets, and planters on balconies are all other means of greening up a building's exterior. Often, it is a mixture of green wall and facade techniques that will be utilised, particularly for home gardens, to make the best use of the existing infrastructure.



Espalier fruit trees to grow them two dimensionally where space is limited (also grown this way in orchards with rows closer together).

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Suggested Tasks

Go back to the green walls you appraised earlier. Take a closer look.

- a) How have they been created?
- b) Would you class them as a green wall or green facade?

Crop Production

Vertical growing is not restricted to the walls and facades of buildings. In fact, greenhouse growers have long made use of what space they have available inside their protective structures to harvest the most amount of produce possible. In taller structures this has led to methods for growing upwards, such as shelving and stacking systems, and the use of A- frames.



Grow strawberries vertically to increase production per square metre.

with their roots trailing into channels through which nutrient solutions are passed. Often these are secured with A-frames or tiered shelving systems and they can be several metres high. The past decade has seen greater adoption of aquaponics systems whereby fish or crustaceans are incorporated into a hydroponics system. Vertical aquaponics systems are used where the fish effluent provides nutrients for the plants so that little or no additional plant fertiliser is required. Generally, the fish tanks are at the base of the vertical aquaponics system.

In recent years vertical farming has taken on another guise in an attempt to feed large city populations with fresh locally grown produce. Many disused industrial buildings such as warehouses have been turned into inner city or urban farms. Even old high rise buildings have been kitted out as farms. In these enterprises, herbs and vegetables are grown under fluorescent lighting. Many of these structures already have frameworks inside which can be adapted to vertical growing. In others, shelving systems can be installed relatively easily.

SCOPE OF VERTICAL GROWING

The Uniqueness of Vertical Gardening

Apart from the obvious advantage that it is possible to grow more biomass on a small footprint, there are some other unique attributes associated with vertical gardening - as well as some possible limitations.

Hydroponics is no different. Over the years a range of innovative hydroponics systems have emerged which also make use of shelving systems. One particular type of hydroponics system known as NFT requires plants to be suspended