

Espaliers: Transforming Ordinary Vegetation into Living Works of Art

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Images as credited

Introduction

Espalier is defined as the technique of training a shrub or tree, usually of a fruiting variety with soft limbs, to grow along a flat plane, such as a fence, wall, or trellis. It is sometimes also used to describe the actual shrub or tree that has undergone the espalier process. Its purpose is multifold: to produce fruitful decorative trees on walls or other support structures; to produce the maximum number of perfect fruits in the least space possible; and to produce a tree that can be trained and cared for using the least amount of time and effort.¹

Espalier is often considered art, architecture, sculpture, and horticulture all in one. When a plant is espaliered, its branches are tied, pruned or grafted to a frame in order to control its shape. This process saves space, especially in a walled enclosure, and also allows the espaliered plants to form a living wall, create privacy barriers, hide unattractive elements of a garden, or add some charm and personality to a blank wall. Although plants grown using this technique may require a bit more care than regular fruit trees when it comes to pruning, the aesthetic returns provide immense satisfaction for the avid garden artist and enthusiast.

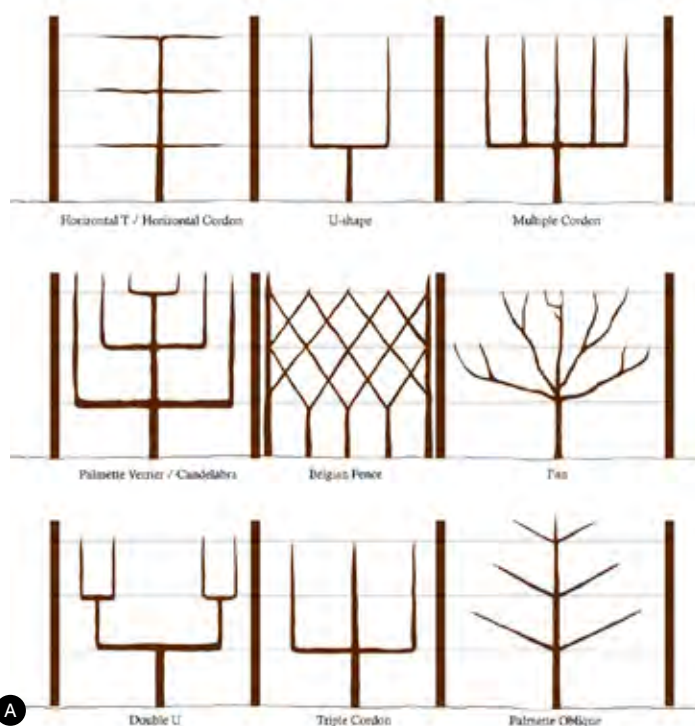
While the word “espalier” itself is French, it is derived from the Italian word *spalla* meaning “shoulder” as early espalier forms were shaped like a person with his or her arms raised straight out to the sides at shoulder height.² In addition, this height allowed the fruits to receive more sunlight and allowed easier maintenance and harvesting. Another thought is that the word espalier originally referred to the actual framework where an espaliered plant would be grown, and some scholars believe the word originated due to the shoulder height frames upon which plants would be espaliered.³

History

The espalier art form has been around since the ancient Egyptians and is still a popular technique today used to create both an aesthetically pleasing form and functional crop, especially when space is limited. Paintings of espaliered fig trees trained flat against walls have been found in the tomb of Egyptian Pharaoh Amenof II, 6th King of the 18th dynasty,^{4,5} although European gardeners, specifically French monks in the late 1600s, are credited to refining and mastering the technique using the artistic and scientific principles of pruning.⁶ French espalier experts have claimed the invention of espalier belongs to Father Legendre of Henonville when in 1684, he is said to have strayed away from the traditional pyramidal shape and started testing out new shapes with his pear trees, writing down his findings in the book *Palmette Legendre*, 1684.⁷

Part of the reason for the development of the technique was due to the practical need to grow more food as quickly as possible, although Father Legendre claimed it was too difficult to reach the fruit at the top of his trees.⁸ The French and English later found that they could redirect a plant’s vertical growth to focus on the branches or spurs, thus resulting in more flowers and fruit; an espaliered tree produces more fruit per foot than normal fruit trees since the pruning of branches causes the tree to go into survival form and cause more fruit and flower spurs as a reaction.^{9,10} Additionally, having the plant grow along a wall had a secondary benefit as well; by planting next to a wall, the wall would reflect more sunlight and also retain more heat, a feature especially useful in colder climates where a few degrees could mean the life or death of a valuable food source. This also meant that trees could be grown outside their normal climate range.¹¹

As time went on, the focus of espaliered trees shifted from an agricultural resource to an art. The French espaliers especially became more elegant, graceful, and pleasant to the eye in terms of architectural proportion, with the art of espalier training reaching a zenith from the 1850s to 1900s.¹² During this period, many master gardeners tried all combinations of unique shapes and everyday objects, such as a vase, a wine goblet, a heart, or even spelling out names. For instance, the master French horticulturalist M. Lepere was able to espalier the word “*NAPOLEAN*” in 1857.¹³ Since then, the espalier may not be as popular as it once was, but it is far from becoming a lost art.



Patterns and Forms

A wide variety of espalier forms exists, from formal and exact patterns to informal, natural patterns. Some of the more popular patterns include the (see Figure A):

- horizontal cordon or horizontal T (a single plant with horizontal branches)
- U-shape (a single plant with two vertical branches from one base)
- multiple cordon (multiple vertical branches from one horizontal base)
- palmette verrier or candelabra (a shape similar to multiple U's layered on top of each other)
- Belgian fence (a lattice shape created by interlacing V's of multiple plants)
- fan (branches fanning up from the sides of a single plant)
- double-U (smaller U-shapes sitting on top of each vertical branch of a larger U-shape)
- triple cordon (a single plant with three vertical branches from one horizontal base)
- palmette oblique (a single plant with symmetrical oblique branches fanning out from the trunk)
- informal (any shape trained to grow along one plane, often used with figs, persimmons, and pomegranates)

A. Popular espalier forms.
Illustration by Michael Kung

Training an Espalier

The first step in training an espalier will be to select what to plant. When selecting, it is important to consider the plant's growing requirements, what works in your climate, purpose (such as a privacy screen or for decoration), whether the espalier will be trained against a wall or freestanding support, as well as required maintenance. In addition, the form will need to be taken into account since different forms have different requirements. For instance, plants in a horizontal cordon, candelabra or palmette should be at least 6 feet across while Belgian fence forms or oblique cordons only need to be set 2-4 feet across.¹⁴ The rigid structure of formal patterns can be more easily maintained by selecting less vigorous trees while informal patterns are best achieved by using vigorous trees.¹⁵ Once you have selected a plant that suits your taste and meets your needs, you will need to find a young plant and a support framework, such as a wall or trellis.

Espaliers traditionally involve training a plant while in its seedling stage. However, it is also possible to start espalier cultivation from a young tree with side shoots, thus skipping the process of formative training from scratch. Young trees are easier to train than more mature ones as the latter would have established branches that are too stiff to be shaped and can snap when overly bent. Depending on the species, the young trees are typically slightly more than a year old when they undergo training to their desired shape. Table A includes a non-inclusive list of suggested plants for espalier.

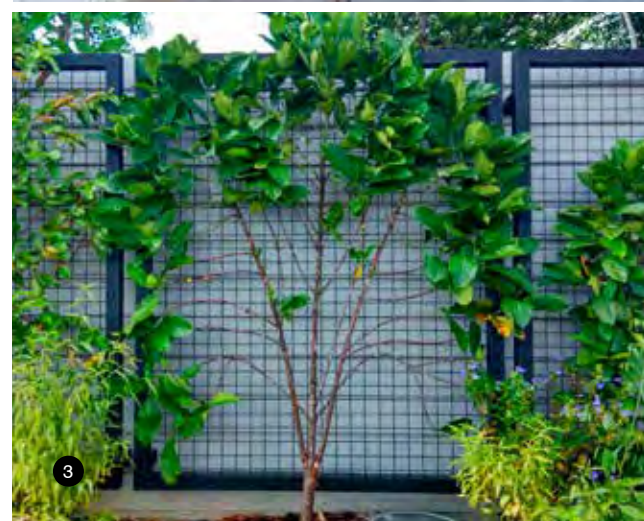


Table A. Examples of Popular Plants for Espalier

Fruiting Trees Genus Name Common Name (Specific example)	Ornamental Plants and Trees Genus Name Common Name (Specific example)
<i>Malus</i> Apple/Crabapple	<i>Acer</i> Maple (Japanese maple)
<i>Pyrus</i> Pear	<i>Camellia</i> Camellia (<i>Sasanqua camellia</i>)
<i>Prunus</i> Stone fruit (Peach, Nectarine, Plum, Almond, Apricot, Cherry)	<i>Euonymus</i> Spindle (Burning bush)
<i>Ficus</i> Fig	<i>Forsythia</i> Forsythia
<i>Citrus</i> Citrus fruit (Lemon, Orange, Tangerine)	<i>Fuchsia</i> Fuchsia
<i>Vitis</i> Grapes	<i>Viburnum</i> Viburnum
<i>Persea</i> Avocado	<i>Magnolia</i> Magnolia (Southern Magnolia)
<i>Diospyros</i> Persimmon	<i>Jasminum</i> Jasmine

When planting the tree or bush into the ground, the hole should be dug 6-10 inches away from the wall to allow for proper ventilation, maintenance, pest control, and for the roots to grow. This is especially of concern for plants espaliered against a wall where mildew, staining, and wood decay could be an issue. It should be one foot wider than the root ball, and soil should be used to fill around the roots once the root ball is level with the top of the hole. The soil should drain well and be replaced with richer soil if necessary; in addition, the soil at the base of walls often contain containments and building debris such as concrete, which should be removed. The support structure will then need to be prepared to provide the branches with anchor points. The branches can be tied or secured using anchoring devices such as eye bolts, masonry staples, guide wires, or vine ties, and will vary based on the support surface.¹⁶

After the plant has been established, it will need to be continually trained by pruning and bending young branches into the appropriate shape. Unwanted branches and shoots will need to be trimmed, although remember not to cut the top of the main shoot until the plant reaches the desired height.¹⁷ The amount of work required will depend on the pattern, and it is important to remember that to reach a final espaliered plant will take time. It is easier to think of the espalier process as starting with a design phase, moving onto a planting and initiation phase in the first year, continuing into the training phase in years two to five, and ending in the maintenance phase from year five onwards.¹⁸



Singapore's Edible Vertical Garden

Being of French origin, there are naturally many beautiful examples of espaliered gardens throughout Europe, such as the Palace of Versailles or Fontainebleau Palace in France. However, espalier does not stop there, and there are other notable examples around the world, such as George Washington's Mount Vernon in Virginia, U.S.A or Descanso Gardens in California, U.S.A., and most recently in Singapore.

In a bid to introduce this unique horticultural technique to the public in Singapore, the National Parks Board designed its first espaliers display at the Singapore Garden Festival in 2016. The display sought to pique some curiosity especially since espaliers are rarely seen in the tropical region. Espaliers allow fruit trees to be grown fitted against a wall and even against narrow

spaces. This space-conserving technique thus offers apartment dwellers in Singapore, who do not own their own backyard garden, an opportunity to grow fruit trees along their corridors right outside their apartment. Some of the tropical fruit plants that were experimented on include those of: the Coffee (Rubiaceae), Citrus (Rutaceae), Mango (Anacardiaceae), Guava (Myrtaceae), Chiku (Sapotaceae), Star Fruit (Oxalidaceae), and Pomegranate (Punicaceae) family.

As mentioned earlier, it is essential to select the right kinds of plants to cultivate espaliers. The National Parks Board selected plants based on its species, shape, height, and overall health status, although certain plant species have been shown to adapt better to the espalier practice than others. For example, fruit trees like the Coffee Tree and Star Fruit, which have numerous pliable

1. The Belgian Fence at Descanso Gardens in early spring. Image by Joy Albright-Souza

2. Horizontal T espalier. Image by Joy Albright-Souza

3. The Coffee Tree (*Coffea canephora*) leading itself to the fan espalier. Image by Cybil Kho

4. The blooming Star Fruit Tree (*Averrhoa carambola* L.) leading itself to a horizontal espalier. Image by Cybil Kho



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branches, are easily trained into espaliers with the horizontal cordon or fan-shaped espaliers. The pliable branches of the fruit trees are pulled into shape against the wall frames and tied using a soft wire, which is covered with small rubber tubes to prevent them from cutting into the branches.

Another advantage of adopting edible living walls in a tropical climate is its potential to mitigate the urban heat island effect. The lower amount of heat re-radiated from green facades and the humidity produced from the evapotranspiration of plants result in a significant reduction of the heat island effect as compared to concrete surfaces. This could save considerable energy needed for cooling buildings in the tropics. This is a contrast from the rationale behind growing espaliers in temperate regions, which uses the heat energy from walls to grow fruits during winter.

Growing fruit trees with the espalier technique allows plants to be cultivated in a restrictive environment, which is a particularly important consideration in Singapore. This means it can be considered a viable way for plant management especially in relatively inaccessible built areas such as on rooftop gardens. For example, the height of the tree is one aspect which can be better managed. Harvesting is also more convenient with more exposed fruits over a flat surface. While the espaliers project continues to take shape here in the tropics, we are excited to see how these lovely works of edible art will look like in their peak form in a couple of years. ^{CC}



Table B. List of tropical plants used for espalier installation by the National Parks Board, Singapore

Tropical Plants	
Genus Name	
Common Name (Specific example)	
<i>Annona muricata</i> Soursop	<i>Dimocarpus longan</i> Longan
<i>Averrhoa carambola</i> Star Fruit	<i>Eugenia uniflora</i> Surinam Cherry
<i>Citrus x aurantiifolia</i> Lime	<i>Mangifera indica</i> Mango
<i>Citrus hystrix</i> Kaffir lime	<i>Manilkara zapota</i> Chiku
<i>Citrus limon</i> Lemon	<i>Psidium guajava</i> Guava
<i>Citrus limon 'Variegata'</i> Variegated lemon	<i>Syzygium aqueum</i> Jambu Air
<i>Coffea arabica</i> Coffee Tree	

5. Branches of the fruit trees are tied to the frame using a soft wire covered with small rubber tubes to prevent them from cutting into the branches. Image by Cybil Kho

6. An edible living green wall of art, with branches of these fruit trees tied to a metal frame. Image by Cybil Kho

7,8. Tropical Jambu Fruit Tree (*Syzygium aqueum* (Burm. f.) Alston), leading itself to the fan espalier. Image by Cybil Kho

References

¹ Edmunds, Alan. Espalier fruit trees, their history and culture, methods of training - pruning - spraying - grafting, etc. Carlton: Horticultural Press Ptg, 1957.

² Ibid.

³ Aby, Katherine and Wester, Nancy. Espalier: essentials of the candelabra pattern. Edina: Espalierservices.com, 2008.

⁴ Liska, Rachael. "Living Works of Art." Saturday Evening Post 281, no. 2 (2009): 66-69.

⁵ Edmunds, 1957.

⁶ "Espalier." Sunset, 2 (1988): 82+.

⁷ Edmunds, 1957.

⁸ Ibid.

⁹ Liska, 2009.

¹⁰ Fletcher, Patricia. "Espalier Trees." Mother Earth News, 140, 10 (1993): 48-78.

¹¹ "Espalier." Sunset, 2, 1988.

¹² Edmunds, 1957.

¹³ Ibid.

¹⁴ "Espalier." Sunset, 2, 1988.

¹⁵ Ibid.

¹⁶ Park Brown, Sydney, Yeager, Thomas H., and Black, Robert J. "Circular 627: Espaliers." PDF, IFAS University of Florida, 2016.

¹⁷ Ibid.

¹⁸ Aby and Wester, 2008.