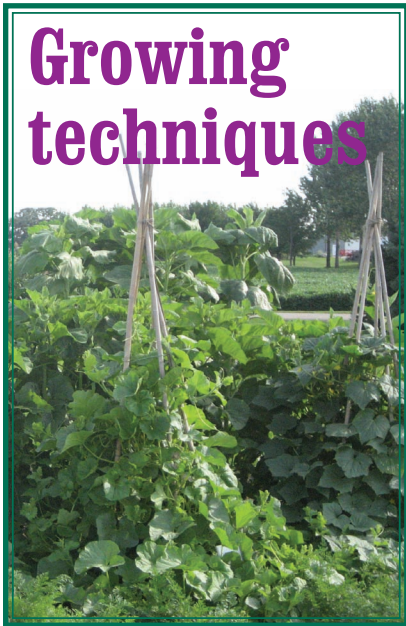


# Growing techniques



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## Trellising, Staking, and Caging— Vertical gardening techniques for vine-type vegetables

Vine-type fruits and vegetables such as tomatoes, melons, and cucumbers are some of the most popular produce grown in home gardens, in community gardens, and by small-scale growers for farmers' markets and other distribution. While others have the space and inclination to let their vines roam free on the ground, others find clear advantages to production techniques such as trellising and staking their vines. Fresh market producers, for example, are increasingly turning to these techniques to enhance production in their hoop houses, greenhouses, and traditional plots. This publication presents the benefits of those techniques as well as details on how you can use them in your own garden, greenhouse, or field.

### The benefits of vertical supports

There are several benefits to vertically supporting vine-type fruits and vegetables during production. Providing vertical support to plants can:

- Protect the plants from physical damage
- Enhance opportunities for organic pest management
- Reduce weeding efforts, especially if mulch is used
- Enable plants to grow upward, minimizing growing space
- Improve harvestable fruit quality and appearance
- Allow better air movement through stems and leaves, which can reduce disease pressure
- Ease harvesting, because fruit are at arm's length and in picking view
- Make it easier to spray or dust for insect and disease control
- Increase yield and gross income per square foot of growing space

Some of the vine-type vegetables that grow best on supports are legumes such as pole beans and peas, tomatoes, cucumbers, gourds, melons, and squashes. Most vines grow strong enough to support the fruit they bear and increase in strength as the fruit get heavier. Larger fruit such as melons may benefit from a mesh bag or nylon socks for additional support. Supporting the vines with a proper structure is more important than supporting individual fruits.



Cucumbers grown on a trellis

## GROWING TECHNIQUES

Three popular methods of supporting plants are staking, caging, and trellising. Many different designs can be used for vine support: cages (wire or wooden), tripods, linear fencing using woven plastic twine, or mesh products such as nylon netting and wire.

### Staking

Staking requires 5- to 6-foot wooden, metal, or plastic stakes. Many products such as PVC pipe, electrical conduit, bamboo stakes, galvanized pipe, and wooden or steel fence posts make excellent stakes. Wooden stakes should be at least 1 inch square. Do not use chemically treated wood. Metal stakes can be of smaller diameter and have the advantage of lasting many years.

Vines can be tied to single stakes, or three of four stakes can be grouped and secured at the top to form a tripod structure, with vines trained to climb each pole. Another method is to weave a wire, cording, or wood such as saplings and branches between the tripod stakes and train vines to climb along the woven material and up the tripod structure.



Tripod formed by stakes tied together

The **stake-and-weave method** (Figure 1) is an alternative system to support plants in a row. Stakes are spaced about every 6 feet. Use polypropylene or nylon cording (it doesn't stretch like cotton or hemp products): tie the cord to the first stake about 6 to 10 inches above the ground. Run the cord to the second stake and wrap it around the stake once at the same level; be sure to keep the cord tight. Repeat this process, going on to the third, fourth, and remaining stakes until you reach the end of the row. Come back with the cord on the opposite side of the stakes, wrapping it around each stake. Plants are held in the space between the cords; this will help support plants that do not form tendrils, such as tomatoes.

Repeat this process as plants grow so the branches are always held between the cording. Three to five runs down the row should be enough for the season. If the woven cording begins to stretch apart, tie the parallel cords together about midway between the stakes for added plant support. While this method is very successful with tomato plants, be sure to prune out the suckers as the plants grow in order to reduce the foliage that must be supported.

### Caging

Cages are used with tomatoes, squash, melons, and other vegetables. Two-foot diameter cages fashioned from wood or wire allow for easy trellising and harvest. Hog-wire, woven wire panels, or concrete reinforcing wire can be used; each comes in a 4-inch square grid. These materials have the strength necessary to support healthy vines with heavy fruit. For a 2-foot diameter cage, a 6-foot linear segment of wire is required, while a 9-foot linear segment is needed for a 3-foot cage. Roll the wire into a tall cylinder and secure the ends. Two stakes driven into the ground are then used to support the cylindrical cage. For ease of plant management, cage your vegetable plants at planting and train the vines to the inside of the cage as they grow.

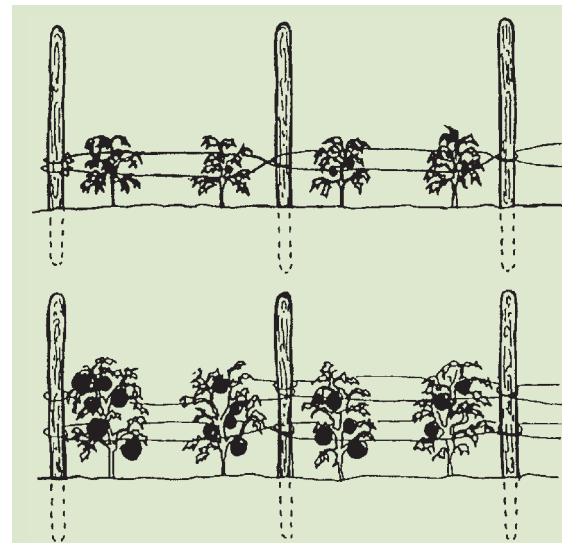


Figure 1. Stake-and-weave system

## Trellising

A vertical trellis can be built by setting sturdy support posts about 2 feet into the ground about 12 to 20 feet apart. The tops of the posts should be about 6 feet above the soil surface. Stretch a heavy wire, barbed wire, cable, or wooden two-by-four between the tops of the posts and another, if desired, between the bases of the supports, near the soil.

One trellising method is drop vertical twines from the upper support down to each plant. A double wire works especially well as a support here because it prevents twine from slipping to the center as the top wire sags with the weight of the plants. Tie the vertical support to the base of each plant or to a bottom wire, if one is used. As plants grow, wrap them around the twine for support or tie or clip them to the twine using plastic clips that greenhouse tomato growers use (see **Resources**).

Another trellising method uses nylon mesh or hog wire with 4-inch square grid. Either material can be attached to the upright stakes and upper supports to provide trellising. With this method as well, use ties or clips to train the vines to the mesh as they grow. When using wire mesh for trellising, check that the fruit does not imbed itself into the wire.



**Vertical trellis using nylon mesh for supporting vegetables**



**Nylon mesh supporting cucumbers**



**Weak-caned raspberries attached to a vertical trellis**

## Maintenance

Garden cleanup is a little different for vertically supported crops. After your vines are through producing for the season, let them dry and become brittle on their supports, even over-wintering them, so they can be broken apart for easier removal.

Whether you dismantle your support structure at the end of the season is a matter of choice. One reason to do so is to reduce the wear and tear that occurs in the winter, especially with wooden structures.

Another reason to take your structure out of the soil is to move it to another part of the garden the coming year. If you only plan to grow one type of plant, such as tomatoes, you will need to vary the location every year, using a 3-year rotation, in order to maximize yield and minimize disease. By utilizing crop-rotation strategies, however, a permanent trellis system can be used year after year. For more information on crop rotation, see Resources.

With the popularity of the local food movement, things are looking up for vertically supported gardening techniques. Caging, staking, or trellising your vine-type fruits and vegetables will help you maximize yield and better care for your garden.



## Resources

Most of the materials discussed in this publication can be found in your local hardware store. Check your local garden center for plant clips, stakes, cages, and ties for attaching vining crops to trellises. You can also order plant clips (also called tomato clips) and nylon mesh or netting from various online garden sites.

For more information on crop rotation, see "Crop Rotation in the Vegetable Garden": [http://urbanext.illinois.edu/gardenerscorner/issue\\_04/04\\_winter\\_05.html](http://urbanext.illinois.edu/gardenerscorner/issue_04/04_winter_05.html)



Nylon mesh supporting tomato vines

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