



Department of Horticulture

Purdue University Cooperative Extension Service • West Lafayette, IN

Container and Raised Bed Gardening

B. Rosie Lerner

Gardening in containers or raised beds can be just the answer for would-be gardeners who would love to grow their own vegetables and flowers, but lack the space or physical ability for a traditional garden. Growing plants in containers provides an opportunity to garden on patios, porches, balconies, and even windowsills. Raised beds can be used to overcome poor-soil conditions and bring the garden to a height that is more easily reached. While container gardens can be very productive, they do require some special attention.

Containers

Containers that can be used for gardening are limited only by your imagination. Clay, wood, plastic, cement, and metal are all suitable materials for growing plants. Many items around the house can be modified for use as plant containers such as pots, tubs, crates, buckets, bushel baskets, whiskey barrels, tires, wheel barrows, and hanging baskets. Whatever the material, a container must provide drainage of excess water and sufficient space for roots to grow.

When excess water can not escape the container, soil pores that should hold air will be filled with water and roots will die from lack of oxygen. To provide drainage, three or four small (1/4 inch) holes can be drilled in the bottom of the container. Holes larger than 1/4 inch in diameter will allow too much soil to escape. A layer of gravel or pieces of broken pottery can help stop the flow of soil through larger holes.

Wooden containers should be made of a naturally water resistant wood such as redwood or cedar or synthetic lumber such as that made from recycled plastic. If chemically preserved wood must be used, choose lumber that has been pressure treated with a copper-containing product such as alkaline copper quaternary (ACQ). Copper and zinc preservatives that are painted onto the wood are less effective in preventing decay. Do

not treat wood with creosote or pentachlorophenol (Penta) because of potential toxicity to plants, particularly when grown in a small, enclosed area.

Most vegetables and flowers have a rooting depth of 2 to 3 feet in good quality soil, but can be grown in shallower soils. Plants whose roots are restricted will be smaller, less productive and may produce smaller-sized fruits. Small containers dry out more quickly, requiring frequent watering. A minimum depth of 10 to 12 inches is recommended for most plants exposed to drying wind and sun.

Growing Media

A lightweight, well-drained and well-aerated media is best for growing plants in containers. Garden soil alone will soon become compacted in a container garden, leading to poor aeration and water drainage. Premixed potting soil or soilless mixes are offered by many garden supply stores and are ideal for small containers. For larger scale container gardening, mixing your own media may be more economical (see Figure 1 below).

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- To make 1 bushel of soil mix:
 - 1/3 bushel soil
 - 1/3 bushel organic matter (compost, peat moss, well-rotted manure)
 - 1/3 bushel vermiculite or perlite
 - 1/2 cup 5-10-5, 6-10-4, or similar fertilizer
 - Or, to make 1 bushel of soilless mix:
 - 1/2 bushel peat moss
 - 1/2 bushel vermiculite
 - 1/2 cup ground limestone
 - 1/2 cup superphosphate
 - 1 cup 5-10-5, 6-10-4, or similar fertilizer

Figure 1. Recipes for growing media.

Planting

Planting your container garden is much like planting a traditional garden bed. Seeds can be planted in rows or in clusters, depending on the size and shape of the container. By planting transplants rather than seeds, plants will have a head start on the growing season.

Plants that are naturally smaller in size are better adapted to the confines of a container garden. But even large plants such as tomatoes, melons, and squash can be productive if given a large enough container. Many garden catalogs now feature compact cultivars of flowers and vegetables which are more suitable for growing in containers or other small spaces. See Table 1 for suggested container sizes.

Vegetables and flowers can be combined to create attractive planter displays. When mixing different plants, keep in mind the light requirements of each plant. Most vegetables require a minimum of 6 to 8 hours of direct sunlight each day for good production. Many flower species will also thrive in full sun, but there are a number of flowers that must have partial or total shade.

Crop	Minimum Container Size Per Plant (diameter at top)
Beans, Bush	6"
Beets	5"
Broccoli	8"
Brussel Sprouts	8"
Cabbage	8"
Carrots	5"
Cucumbers	10"
Eggplant	10"
Flowers, Annual	6"
Greens	4"
Lettuce	4"
Okra	10"
Onions	4"
Parsley	5"
Peas	5"
Peppers	10"
Radishes	4"
Spinach	4"
Squash	14"
Tomato(dwarf)	8"
Tomato(large)	12"
Turnips	8"

Table 1. Suggested container sizes.

Because container gardens have greater exposure to sun, wind, and heat, they need to be watered more frequently than a garden bed. Smaller containers may need to be watered as often as once or twice a day, depending on weather conditions. Overwatering can be a problem if soil is kept too wet too often. Feel the soil with your fingers, and then water when the top inch of soil feels dry. Be sure to use enough water so some excess runs out of the drainage holes. This will help ensure the entire root area is moistened. Peat moss is very difficult to wet once it becomes dry, so be sure to check for water needs of soilless medias frequently.

Controlling Pests

Plants grown in container gardens are as susceptible to most insects and diseases as those grown in garden beds. However, using clean, pasteurized soil can avoid some soil borne disease and insect problems. You can pasteurize your garden soil by heating a pan of soil to 180°F and holding that temperature for 30 minutes. Semimoist soil will heat more efficiently due to the production of steam. If soil is dry, add one cup of water per gallon of soil and mix thoroughly before heating. Allow the soil to cool thoroughly before planting.

Inspect plants frequently for the presence of foliar insects and disease symptoms. Hand picking insects as they are noticed is effective in controlling small-pest populations. Removing dead leaves, flowers, and overripe fruits will help discourage pests. Pesticides may be necessary to control or prevent pests from beating you to the harvest. Make sure the chemical you use is labeled for use on all plants in the container.

Although weeds are not as much of a problem for container gardens, they can quickly take over a container and compete with crops for light, water, nutrients, and space. Carefully pull weeds while they are still small and shallow-rooted. Overgrown weeds should be cut rather than pulled to avoid injury to surrounding desirable plants. Herbicides are not practical in a container garden. Refrain from using soil from weed infested areas.

Raised Beds

Raised beds are helpful in improving water drainage in heavy clay soils or low-lying areas. Raised beds bring the garden to a height that is more workable for physically disabled or elderly gardeners who cannot stoop or bend over to a flat garden bed. Raised beds tend to warm up earlier in the spring which allows earlier planting. Once the bed is constructed, foot traffic should not be necessary in the bed, thus soil does not become compacted, and soil preparation in the coming years is minimized.

Raising the soil just a few inches may be enough for some gardens. No side support is needed for shallow beds, those less than 6 inches tall. To prevent soil erosion caused by water and wind, gently slope the sides by making the top of the bed slightly narrower than the base.

Deeper beds need wall support to keep the bed intact. Rot-resistant lumber, cinder blocks, bricks, or rock layers can be used to support the sides of the bed. Beds deeper than 18 inches, particularly those built on poorly drained sites, may require layers of drainage material at the bottom to ensure good water drainage and to avoid compaction. Use crushed rock, pea gravel, sand, or drainage tile if needed.

There is no standard size for a raised bed, but keep in mind that you will want to reach everything in the bed without stepping into it. A bed that will only be accessible from one side should be no more than 2 feet wide, while a bed that can be reached from both sides could be up to 4 feet wide.

As with container gardens, raised beds must have a light, well-drained growing media to provide proper aeration. Raised beds can be improved by incorporating manure, compost, or other organic materials as well as vermiculite or perlite. Commercial potting soils or home-made mixes such as those in Figure 1 are ideal.

Treated Lumber

Recent controversy regarding chemical wood-preservation treatments has left many gardeners wondering about the safety of treated lumber.

The EPA recently announced that chromated copper arsenate (CCA) treated lumber will be phased out for use in consumer/residential products over the next couple of years. This is a voluntary decision by industry to move consumer use of treated lumber products away from a variety of pressure-treated wood that contains arsenic by December 31, 2003, in favor of new alternative wood preservatives.

The EPA does not require or recommend replacing existing CCA treated structures at this time. Although the EPA does say that any reduction in exposure to arsenic is desirable, it has not concluded that there is unreasonable risk associated with CCA treated products. For those that are concerned about existing structures in their yard or garden, you can either seal the treated wood every 2 years with an oil-based stain or insert a plastic liner to eliminate contact with soil.

So what will gardeners have to choose from for landscape projects? Alkaline copper quaternary (ACQ) is a relatively new wood treatment that is already being marketed in some areas. This product is higher in copper than CCA, but is free of arsenic. No doubt, additional, environmentally friendly products will be developed in the next few years.

Alternatives to treated lumber include synthetic wood such as that made from recycled plastic, vinyl fencing, and naturally rot-resistant woods such as cedar and redwood. All of these will likely be considerably more expensive than CCA treated lumber. Alternatives to lumber for building garden structures include stone, concrete block, and brick.

Further information about the phasing out of CCA is on the EPA web site at http://www.epa.gov/pesticides/citizens/cca_transition.htm as well as at http://www.epa.gov/pesticides/citizens/cca_qa.htm.

Another excellent reference, "Garden Use of Treated Lumber", is available from Penn State University Extension, at http://www.agronomy.psu.edu/Extension/Facts/Treated_Lumber.pdf.

For more information on the subject discussed in this publication, consult your local office of the Purdue University Cooperative Extension Service.
