



Raised Beds

Deciding If They Benefit Your Vegetable Garden

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS075E

Many vegetable gardeners use raised beds, but other gardeners successfully grow fruit and vegetables directly in native soil. Which system is best for you? This fact sheet will describe the uses of raised beds, and weigh their benefits and drawbacks, so gardeners can decide if they are a worthwhile gardening investment. Some basic tips on raised bed soil preparation and management are also included.

Raised beds can be either uncontained or framed. An uncontained bed is simply native soil mounded in a narrow bed (usually 2 to 4 feet wide). Framed beds (Figure 1) often use imported soil, held in place by a structure of wood, concrete blocks, or other materials. These beds take up less space than uncontained beds and protect soil from runoff and erosion.

Weighing the benefits and drawbacks to raised beds

Benefits of raised beds:

- They improve soil drainage, allowing soil to dry and warm faster in the spring, and provide a better environment for growing perennial crops (such as raspberries) that need well-drained soils.



Figure 1. Wood-framed raised bed.

- They allow gardening in areas with little or no soil, unsuitable soil, or contaminated soil.
- They can fit neatly into small spaces, a boon to gardeners with limited land.
- They can raise the height of the garden, increasing accessibility for people who have difficulty bending and stooping.
- They can contain garden soil in areas prone to runoff or close to storm drains, such as steeply sloped lots or parking strip gardens, which reduces runoff of soils and contaminants into waterways.

Drawbacks of raised beds:

- Imported soil used in raised beds is often of lower quality than many native Northwest soils.
- Soils in raised beds dry out faster than native soils, making diligence in summertime irrigation essential.
- The time and cost of building materials, construction, and maintenance can sometimes be a barrier to using raised beds.

Deciding if you need raised beds

Raised beds make good sense if:

- You need better drainage, so you can get an early start on your garden
- You need better drainage, so you can grow crops sensitive to wet conditions
- Your neighborhood soil is known to be contaminated or your garden area is on land which was formerly a commercial orchard
- You are physically uncomfortable gardening at ground level (Figure 2)
- You are gardening in an area prone to runoff and erosion

Otherwise, evaluate your soil—for depth, texture, and compaction—to decide whether native soil or a raised bed would serve you best.

We often assume that soils in urban yards have been disturbed to the point that they are no longer productive, but



Figure 2. Tall raised beds for accessible gardening.

that is not always the case. To check out the soil in your future garden spot, all you need is a spade or shovel, some elbow grease, and some simple observations. Choose a spot that receives at least a half day of sun during the growing season, and begin digging a small hole. It is best to do this when the soil is moist (but not wet) and easier to dig. If the digging is difficult, decide if it is because of soil compaction or rocks. Many Northwest soils are rocky, but with patience you can loosen the rocks and continue digging. Dig as deep as you can – and if you can make it to 12 inches or more, you have enough native soil for a vegetable garden. If you hit a layer of soil you cannot dig through, you may have reached “hardpan,” (a compact or cemented layer that is a barrier to roots), or a layer that is full of rocks, which means you are at the bottom of the usable soil.

Take a handful of moist soil and estimate its texture. Texture tells us a lot about the ability of a soil to hold and drain water and hold nutrients. Soils that feel gritty contain mostly sand and are good at draining water but not holding it. Soils that feel smooth like flour contain mostly silt and hold water more tightly. Soils that are sticky and easy to sculpt contain a lot of clay. Clay soils are slow to dry in the spring and can be difficult to work with when too wet or dry. Soils that are a mixture of sand, silt, and clay are called loams, and they are generally good at draining and holding water. Loamy soils have a little grit but hold together well in your hand. To learn how to estimate the texture of your soil, watch a short WSU video [1], and then try it yourself.

Choosing soil for raised beds

Gardeners usually use commercial “topsoil” for filling raised beds. However, it is seldom truly topsoil and is more appropriately called landscaping fill. Landscaping fill is usually a mixture of sand and organic material such as compost. The sand has large pores (macropores) that allow water to infiltrate and drain, while the organic matter increases the capacity of the fill to hold water and nutrients. The result is a mix that drains water well but dries out more quickly than most native soils. Some special-

ized mixes are similar to potting soil, containing peat and vermiculite, as well as compost. These mixes are more expensive and designed for shallow raised beds with no soil underneath, a rooting environment that is similar to a pot. In most cases, these specialized mixes are not needed.

Why not obtain real topsoil for filling raised beds? Natural processes in native soil create a structure of aggregates with macropores between them (Figure 3). Again, macropores are the pathway for water infiltration and drainage, and small capillary pores within the aggregates hold water, storing it for plant uptake.



Figure 3. Soil aggregates topsoil (r), subsoil (l).

Excavating, transporting, stockpiling, and spreading topsoil destroys that structure, resulting in a material with few macropores and poorer drainage capacity than native soil left in place. Sandy landscaping fill is a compromise that allows water to infiltrate and drain from the outset, but it will never have the capacity to hold much water.

So if you purchase landscaping fill for raised beds, expect a sandy material mixed with organic matter. Not all landscaping fills are high quality – some may contain rocks, trash, or large sticks. It is wise to inspect the fill before you purchase it.

Adding soil to raised beds

If you are building low, uncontained beds, you can use native soil from the pathways between the beds. Simply digging the soil from the pathways and placing it in the beds does little damage to its structure. Mixing compost with the native soil in the beds will help create structure and improve water movement. The beds will need to be reshaped each year to counter the effects of settling and erosion.

If you are filling framed beds, you will likely need to purchase landscaping fill. Because the fill is usually a different texture from your underlying soil, it is good to mix the fill with your soil as you build the bed, so that you have a tex-

tural gradient rather than a sharp textural boundary. Sharp textural boundaries slow the downward flow of water. Add 3 or 4 inches of fill to the bed and dig it into the underlying soil, then add another layer of fill and dig it in again, repeating until the bed is full. Do not worry if a few rocks from the underlying soil get mixed into the bed. If you are building beds because there is no soil, then layer the fill directly onto the existing surface. In this case, you will want beds at least 12 to 18 inches deep, because the entire root zone of the plants will be in the fill material.

Selecting materials for building frames for raised beds

Construction materials frequently used for raised beds include untreated wood, pressure-treated wood, concrete blocks, and boards made with recycled plastic. Untreated wood is inexpensive and easy to use but often begins to decay within a few years, even if you use more resistant wood such as cedar. Treated wood is more expensive than untreated wood, but it lasts much longer. Concrete blocks come in a variety of styles and are long lasting but are more expensive and heavier to handle (Figure 4).



Figure 4. Ornamental raised bed with concrete blocks.

Boards made from recycled materials were originally designed for deck flooring and can bend unsupported over the length of a raised bed. These boards are expensive but easy to work with and long lasting (Figure 5).

Using treated wood has been controversial because in the past it contained elevated levels of arsenic, as well as copper and chromium (CCA wood). Arsenic is the most problematic, because it is not as tightly held to the soil as copper and chromium, and small amounts can be taken up by plants. Treated wood produced since 2003 does not contain arsenic, but most types still contain copper. The risk of food contamination from treated wood in raised beds appears to be low. Nonetheless, if you have concerns, you can use other materials, or cover the inside walls of the raised beds with plastic. For more information on treated wood in raised beds, see links [2] and [3].



Figure 5. Raised bed using decking boards from recycled plastic.

Irrigating and maintaining raised beds

If your soils have medium to heavy texture or are poorly drained, raised beds will allow you to get around these problems and start your gardening season earlier in the spring. But you will also find that the soils dry out much faster in the summer (particularly if you use landscaping fill), and you will need to be diligent about irrigation. Because landscaping fill does not hold much water, you will need to irrigate more frequently but at lighter rates. Raised beds are an excellent place to use drip irrigation to conserve water.

The settling of fill material and decay of organic matter will reduce the depth of soil in raised beds. So you will need to replenish the beds every year or two with more fill and/or compost to maintain their original depth.

For more information

Soil texture:

- [1] Determining soil texture by hand. (WSU Video)
http://www.puyallup.wsu.edu/soilmgmt/Videos/Video_SoilTexture.htm

Treated lumber in raised beds:

- [2] Pressure treated lumber and raised beds. (Oregon State University)
<http://smallfarms.oregonstate.edu/sfn/w10PressurizedLumber>
- [3] Garden use of treated lumber. (Penn State University)
<http://pubs.cas.psu.edu/freepubs/pdfs/uc173.pdf>

Tips on gardening in raised beds, including raised bed design, planting density, and management. (Some of the information in these bulletins is specific to the climate and soils of their geographic area, but the general information

on design and planting density is valid across regions):

- [4] Raised bed gardening. (Auburn University, Alabama)
<http://www.aces.edu/pubs/docs/A/ANR-1345/ANR-1345.pdf>
- [5] Raised bed gardening in Alaska. (University of Alaska-Fairbanks)
<http://www.uaf.edu/files/ces/publications-db/catalog/anr/HGA-00132.pdf>
- [6] Raised bed gardening. (Kansas State University)
<http://www.ksre.ksu.edu/library/HORT2/MF2134.PDF>

Northwest gardening tips:

- [7] Fall and winter vegetable gardening in the Pacific Northwest. (Oregon State University)
<http://extension.oregonstate.edu/catalog/pdf/pnw/pnw548.pdf>
- [8] Home gardens. (Washington State University)
<http://cru.cahe.wsu.edu/CEPublications/eb0422/eb0422.pdf>



By **Craig Cogger**, Extension Soil Specialist, WSU Puyallup Research and Extension Center.

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