Raised Beds

Construction

The rockiness and steep slopes of northern Arizona's upland areas can make it very challenging to grow annual flowers and vegetables. Where soils do exist, rocks can be removed and the soil amended, but often, the amount of rock or the presence of shallow bedrock make this very challenging. Here, gardeners have little other choice than to use containers and/or raised beds. Containers vary greatly in size, materials, and cost, and they provide a limited amount of growing space. For dedicated gardeners without a natural garden plot, raised beds are often the best option.

Although there will be initial expense and labor in constructing raised beds, the finished product should last for many years and provide useable growing space. The choice of framework for walls depends on the availability and expense of the construction material, as well as the desired appearance of the final product in the landscape. Naturally rot-resistant lumber, such as redwood or cedar, may also be used. If you have an ample supply of native rock onsite, it can be dry-stacked or mortared together. Other possibilities include sheet metal, wood, concrete blocks, bricks, or synthetic lumber made of recycled plastic.

National gardening publications have raised concerns about the safety of using treated lumber for raised beds in food gardens. The US Environmental Protection Agency phased out the consumer/residential use of lumber treated with arsenic containing compounds in 2003 and those treatments have been modified to use copper containing compounds. Similar concerns exist for creosote and the use of railroad ties for use in raised beds for food production. After reviewing the available information, I would recommend that copper treated lumber be used where another material, such as galvanized sheet metal, is in direct contact with the soil.

Raised beds can vary depending on the gardener's goals and the topography. Hillside terraces may require different bed dimensions than those used for flat-land vegetable gardens. On hillsides, follow the contour of the land and adjust the depth of beds according to the slope of the hill. On flat ground, you can be more creative. Make sure pathways are wide enough to allow equipment and/or wheelchair access depending on your goals and needs.

A convenient width to use for raised beds is 4 feet. Here, the center of the bed is accessible from either side. Lumber for constructing beds is readily available in 4-foot length multiples, minimizing the amount of sawing necessary and the amount of waste produced during construction. If the bed is accessible only from one side, limit the width to 3 feet. Most gardeners find it uncomfortable to reach farther than 3 feet to tend the bed. Bed height can vary, but 18 to 24 inches is fairly common. The length of a raised bed is not critical. However, you should divide long distances into shorter beds (24 feet is probably a good maximum length). Three-foot-wide walkways are usually adequate. These can be mulched with weed barrier and/or wood chips to minimize weeds. If pocket gophers are present, place hardware cloth in the bottom before filling with soil.

Soil for Raised Beds

After you have built your raised beds, you are faced with finding suitable soil to fill it. This can be a difficult decision and quality topsoil may be challenging to locate and expensive. Bagged products are expensive and often contain lots of organic materials and lack actual mineral soil. This is an important decision.

Many Northern Arizona gardeners use raised beds and large containers to grow annual crops such as flowers and vegetables. Most people do this because available soil on their property may be shallow, rocky or nonexistent. Raised beds have many other advantages: convenience, accessibility, improved drainage, ease of frost and pest protection, weed management, and more. A major disadvantage in some raised bed gardens is limited space making it difficult to rotate crops.

Crop rotation is critical in maintaining productive, disease-free garden plants. Most raised bed gardeners want to grow tomatoes and peppers which are both in the Nightshade Family (Solanaceae) often growing them in the same bed in successive years. Many disease organisms are soil-borne and can persist in the soil. Disease problems usually increase when the same “plant family” is planted in the same area in successive years. Similarly, insect problems can become more severe when crop rotation is not practiced.

Raised bed gardeners often have limited space for crop rotation. In addition, they may have filled their raised beds with bagged, artificial soil media (potting soil). Cooperative Extension help desks receive many calls each year from clients describing how their raised bed garden has become less productive after two growing seasons. After questioning these clients, invariably their raised beds were filled with artificial soil media and they have not practiced crop rotation.

Artificial soil media is widely sold for potted plants and seed starting. It is also popular with people that have “container gardens”, pots or larger containers such as half barrels and livestock watering troughs. Artificial soil media contains no mineral soil. It is usually a combination of peat, perlite, bark, coir (ground coconut hulls), and a small amount of inorganic fertilizer. In recent years, water-holding, hydrogels are also added to commercially available artificial media. Artificial media works well for potted plants and seedling transplants. However, when used in raised beds, disease organisms build up and fertility declines when used for more than one season. Container gardeners are always more successful when artificial soil media is replaced each year. The spent media can be composted where beneficial microorganisms in the compost pile can colonize it and break it down further.

Mineral topsoil is the most desirable media for raised bed gardening. Mineral topsoil consists of sand, silt, clay, and locally-adapted beneficial soil microorganisms. Ideally, the soil is gleaned from other areas of your property and is free of weed seeds and other propagules (perennial weed rhizomes). Rocks and gravel should also be screened out before placing it in the raised bed. If soil is not available on your property, seek out vendors that provide non-amended topsoil so you have the freedom to select amendments used. Local mineral topsoil should also contain locally-adapted beneficial soil microbes including mycorrhizae (beneficial fungi), bacteria, and protozoa. Compost, alfalfa meal/pellets, and other organic amendments can be added to create a productive, resilient garden soil.

Pre-amended “topsoils” sold by some vendors contain coarse woody debris which is resistant to decomposition and horse/steer manures which contain concentrated salts from saturation with animal urine. Cooperative Extension has measured the salinity (salt content) of several amended topsoils and found many of them to have high salinity. Leaching with water can lower the salinity, but why not avoid unnecessary work and water use. Use non-amended topsoil, preferably with a loamy soil texture (a balanced mixture of sand, silt and clay). Soil texture can be approximated by anyone willing to get their hands dirty (see Soil by Texture Feel link on page 4). Purchasing mineral topsoil will involve some labor to transport the soil from where it was delivered to the location of your raised bed.

Mineral topsoil will provide a sustainable, productive substrate for your gardening endeavors. It can be further enhanced by growing cover crops and minimizing tillage to develop robust, locally-adapted soil microfauna.

Here are a few recommendations for raised bed gardeners to consider:

- build additional beds if space is too limited to rotate crops
- install hardware cloth deep under beds to deter pocket gophers
- build low tunnels to facilitate winter gardening
- develop compost processes/resources that support your raised bed

Enjoy the healthy food harvested from you raised beds!

Raised beds constructed of wood and corrugated sheet metal (Photo by Rebecca Serratos, University of Arizona).

Raised beds at Cal Poly, San Luis Obispo showing various crops (Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org).

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