



Straw Bale Gardening

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What is a straw bale garden?

A straw or hay bale garden is a gardening method used for raising vegetables, herbs, and flowers directly on a bale. Straw or hay bales from alfalfa, wheat, oats, rye, or other cereals are suitable for making a garden bed. Straw bales are preferable over hay because hay bales contain more weed and grass seeds. The bale should be tight and held together with 2-3 strands of plastic baling twine—preferably made from a biodegradable material such as jute and sisal (Figure 1). Biodegradable twines should be positioned parallel to the ground to avoid their hastened decomposition.



Figure 1. Position the bale so that the baling twine is parallel to the ground. The yellow tape was used to measure the dimensions of the bale.

Advantages

- Bales are about 2 feet tall, which makes gardening more accessible for gardeners who have difficulty bending over. The bales are not permanent and are usually removed at the end of the season.
- Used bales can be used as mulch, added to a compost pile, or spread on the ground to enrich the soil.

- No digging or soil preparation is required, a big advantage if you have hard or rocky soil or if you live in an area where soils may be contaminated with heavy metals.
- Bales can be placed on concrete or asphalt paving.
- Bales are an inexpensive way to create raised beds for gardening (Figure 2).



Figure 2. Cantaloupe grown on straw bales.

Source and cost

Straw or hay bales can be obtained from a variety of places, such as a local farm store or directly from a producer. In farm areas, straw bales should be easy and inexpensive to purchase (\$5 or less per bale.) You will want a bale that is held together tightly with baling twine encircling the bale in two to three places. Old, unrotted bales work well if bales are still held tightly together by the twine.

This fact sheet is part of the WSU Extension Home Garden Series.

The steps

Bed preparation

Bales can be arranged based on space, type of production, and mobility needs. You can also design the placement of the bales for an attractive appearance. In any case, ease of maintenance should be considered when designing the garden. Planting height, row width, sun exposure, and watering convenience are important.

Bale Conditioning

- Water the new bales thoroughly and keep them wet for 3 days (days 1-3). Keeping the bales moist is very important. Once the bales have been watered, they will be very heavy, so be sure they are situated where you want them before you start watering. As the inside of the bales begins to decompose, they will start to warm up. This is part of the conditioning process.
- On days 4, 5, and 6, sprinkle the top of each bale with 1 cup of ammonium sulfate (21-0-0) or ½ cup of urea (46-0-0), watering the fertilizer in after application. This speeds the decomposition process. On days 7, 8, and 9, cut the amount of fertilizer per bale in half. Take care not to water excessively, which could lead to runoff and leaching of the nitrogen out of the bale.
- On day 10, stop adding fertilizer, but keep the bales moist.
- On day 11, feel the top of the bale for heat. If still hot, check every day until the bale cools down to about 99°F or lower, still keeping bales moist by watering when needed.

Planting Methods

Straw bales should be ready for planting 3 to 4 weeks after conditioning begins. There are 2 ways to plant the bales:

1. Pockets or 'holes': Create pockets about 3 to 4 inches deep by loosening and removing a small amount of the straw (Figure 3a) and filling each hole with growing medium. The number of pockets will vary, depending on what crops you intend to grow and the spacing needed for those crops. It takes about 10-15 minutes to make 4 pockets on a straw bale (Figure 3a).
2. Flat straw bed: Create a flatbed on top of the bale by spreading growing medium on the top of each bale (Figure 3b).

For both methods, the growing medium can be a mix of a well-rotted, good quality compost, soil, aged manure, and other nutrient rich materials. The growing medium is needed to create a suitable rooting environment for successful production on the bale beds. Approximately 1 lb of growing medium is needed to fill each pocket. For the flat-bed method, a 3-4 inch deep layer of growing medium works well. Once the growing medium is in place, moisten the medium and the bales.

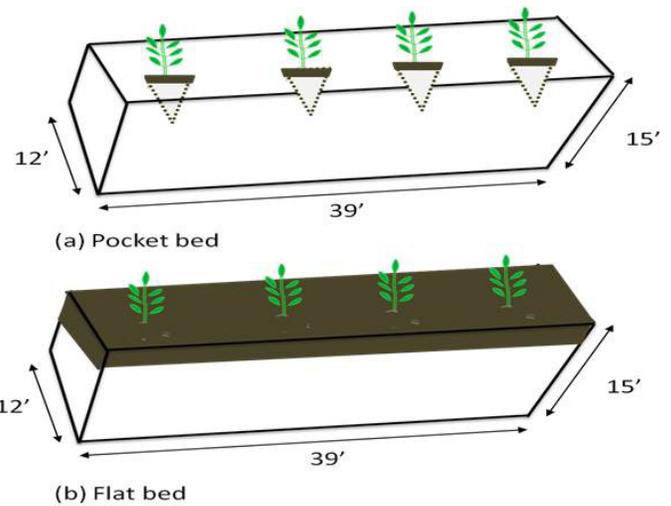


Figure 3. Two types of beds: (a) pocket or "hole" and (b) flat.

Seeding and Transplanting

You can plant your bales using transplants or seeds for both the pocket and flatbed methods. Alternatively, direct seeding can be used when practical because it allows germinating seeds to form extensive roots within the growing profile. The number of plants per bale depends on the space requirement of the specific crops and cultivars being planted. Table 1 includes suggested number of plants per bale.

Table 1. Straw Bale Planting Guide.

Crop	Suggested number of plants per bale
Cantaloupe	2
Cucumber	3-4
Peppers	3-5
Pumpkins	2
Squash (winter)	2
Squash (summer)	2-3
Tomatoes	2-3

Garden management

Watering

Watering is perhaps the most crucial consideration in bale gardening because water moves out of the straw quickly. There are several ways to handle this issue. An effective, less labor-intensive watering system can be achieved with drip irrigation or a soaker hose system on timers. Low-input resources can be used innovatively to build an alternative passive watering system. For example, a 2-liter soda bottle or a gallon milk container can be used for watering. Poke drip holes in the lid of the container and then fill the container with water and place it upside down about 1 inch away from the target plant (Figure 4). The water will then drip out slowly over the next day or two, depending on the size of the drip holes and the tempera-



Figure 4. Pierce the lid of a plastic bottle, fill with water, secure lid, set bottle upside down into the bale to provide drip irrigation.

ture. Temperature affects how quickly the plants take up the available water. Liquid organic nutrients can be added to the water.

Fertilization

Adequate nutrient supply is critical for plants growing in bales. Make sure that plants have a sufficient supply of the major nutrients nitrogen, phosphorus, and potassium throughout the season. Nitrogen deficiency is very common in straw bale beds because the microbes are using much of the available nitrogen to break down the bale, and nutrients are lost from leaching. If the oldest leaves begin to turn yellow before their physiological maturity, this is an indication that nitrogen may be limiting (Figure 5). Purpling is a symptom of phosphorus deficiency, while leaf margin necrosis (brown leaf edges) is a symptom of potassium deficiency.



Figure 5. Nitrogen deficiency in pepper.

If plants show nutrient deficiency symptoms, apply a handful (about 3.5 oz) of aged manure, compost, or a mixture of the two in the affected hole. If you use organic fertilizers, such as blood meal and fish meal, nutrients are more readily available than from the manure. Because

compost and most organic fertilizers release nutrients slowly, they are most beneficial when applied at planting. However, inorganic fertilizers will provide nutrients at a faster rate and are more useful for providing nutrients quickly when plants are exhibiting symptoms of nutrient deficiencies. Foliar application of micronutrients can also be an alternative way to ensure balanced nutrition in bale gardens. Some of these products are expensive and may not be available in small packages. However, group order may help to get around this problem.

Weed Control

An added bonus of the straw bale garden is that, in general, there will be very few weeds. Some grass and weed seeds may germinate from the bale, but these are usually easy to remove early in the season. Use properly cured compost instead of raw manure to avoid weeds.

Insect Control

Ground-dwelling insects will be less of a problem in straw bale gardens because the bales elevate the plants above the ground level. This helps prevent ground dwelling insects, such as cutworms, from attacking plants. Also, because bales are used for only one season, the lifecycle of some insects is disrupted. Regardless, it is essential to apply the principles of Integrated Pest Management (IPM) to prevent and control insect pests in straw bale garden.

Recycling bales

Bales will usually last for only one growing season, two at the very most. After the growing season is over, recycle the bales by using them as mulch in beds or pathways, placing them in the compost pile, or working the rotted straw into the soil. If you do not have a garden where you can recycle the rotted bales, there's probably a local gardener you can find who would like to take them.

For More Information

Abrahamson, R. Hydroponics in the Garden? University of Minnesota Extension, Clay County. <http://www.co.clay.mn.us/Depts/Extensio/ExAPHydr.htm>.

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Straw Bale Bed: A Way to Garden While Building Soil. Oklahoma Cooperative Extension Service PSS2264. <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-7191/PSS-2264web.pdf>. http://anr.ext.wvu.edu/lawn_garden/straw_bale_gardening.



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Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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