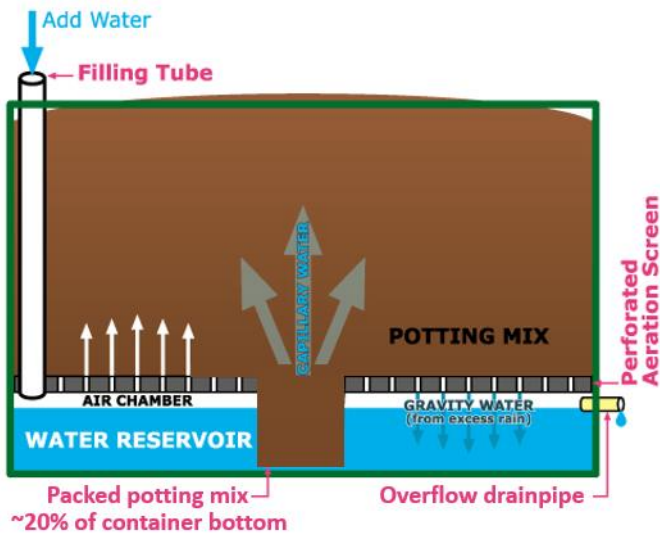


Wicking Gardens Made from an IBC Tote



the bottom of the garden bed through the soil to the top, watering the roots of the plants from below. The water moves by “capillary action” – just like fuel moving up the wick of a kerosene lamp.

Wicking beds are unique and an increasingly popular way to grow vegetables. In this article, we’ll deal with a simple container wicking IBC tote, however there are many variations in the types, sizes, and complexity of wicking containers—from 5-gallon buckets to large pond liner raised beds. We’ll describe building the wicking bed using a 275- or 330-gallon IBC tote cut in half, but the principle works with most any container. Do some web searching, there is lots of information available.

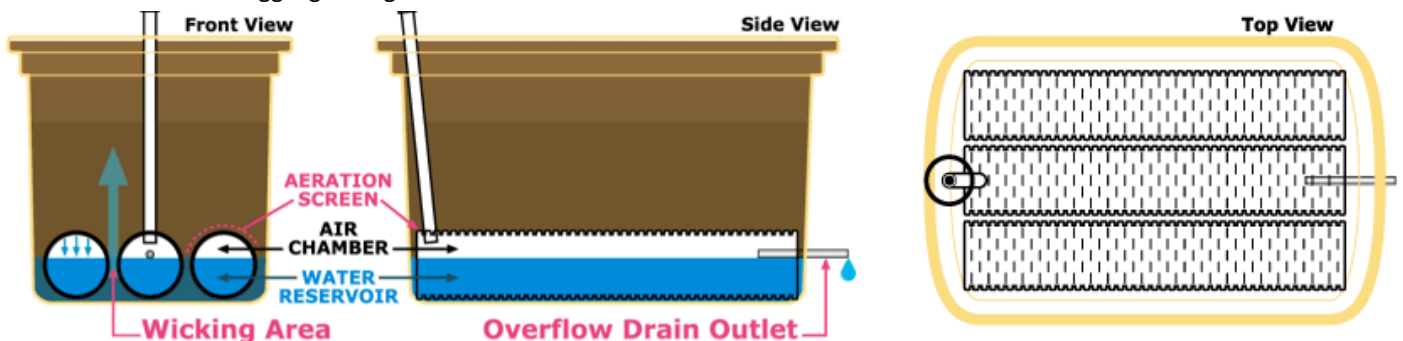
Wicking beds are self-contained garden beds with built-in reservoirs that supply water from the bottom up, while aerating your plants from below. The concept changes how, when, and how much you water your raised beds. The water moves from a reservoir at



There are several advantages of wicking beds. First, they are water efficient. Watering from the bottom up prevents evaporation of surface water (which occurs when you water beds from the top). They use 40-50% less water than a conventional garden—even less if top mulched. When the plant wants water, it takes it; you can’t over-water your plants. Wicking containers require less time spent watering because they water themselves – plants have less risk of over or under watering. It’s also harder for weeds to establish and because we have so many trees and grasses with invasive roots here in the Texas hill country, they are ideal for gardens near trees with invasive roots. And finally, not only can they be made cheaply from recycled materials (although more complex expensive options exist), but the garden beds are also raised so they are easier to use by the elderly or people with an injury or disability.

All you need is a container that can contain water. It can be half an IBC tote, a cattle watering trough, half of a 55 gallon barrel, a cattle feed mineral tub, a heavy duty plastic box, or an old bathtub—use your imagination. Then get some perforated sewer pipe, some sewer pipe sock material, some 1” PVC for an inlet fill pipe, a short piece of ½” overflow PVC pipe (lengths will vary depending on size of container). Then we need some soil mix, compost, water, mulch, and some seeds, seedlings, or plants.

Wicking beds are not a universal gardening solution, and if we keep this in mind and use them where they perform best, we can best make use of the benefits while avoiding the disadvantages. Wicking beds, much like hydroponic systems, are best suited to growing annual vegetables, which are so short lived they don’t live long enough to develop long term problems due to the soil conditions and require large amounts of nutrients in a short period. Raised bed gardening differs from in-ground gardening in that you must supply raised-bedded plants with the nutrients they need. However, since wicking beds retain fertilizer in the water reservoir, less fertilizer can be used for annual veggie growing.



Instructions for an IBC Wicking Garden

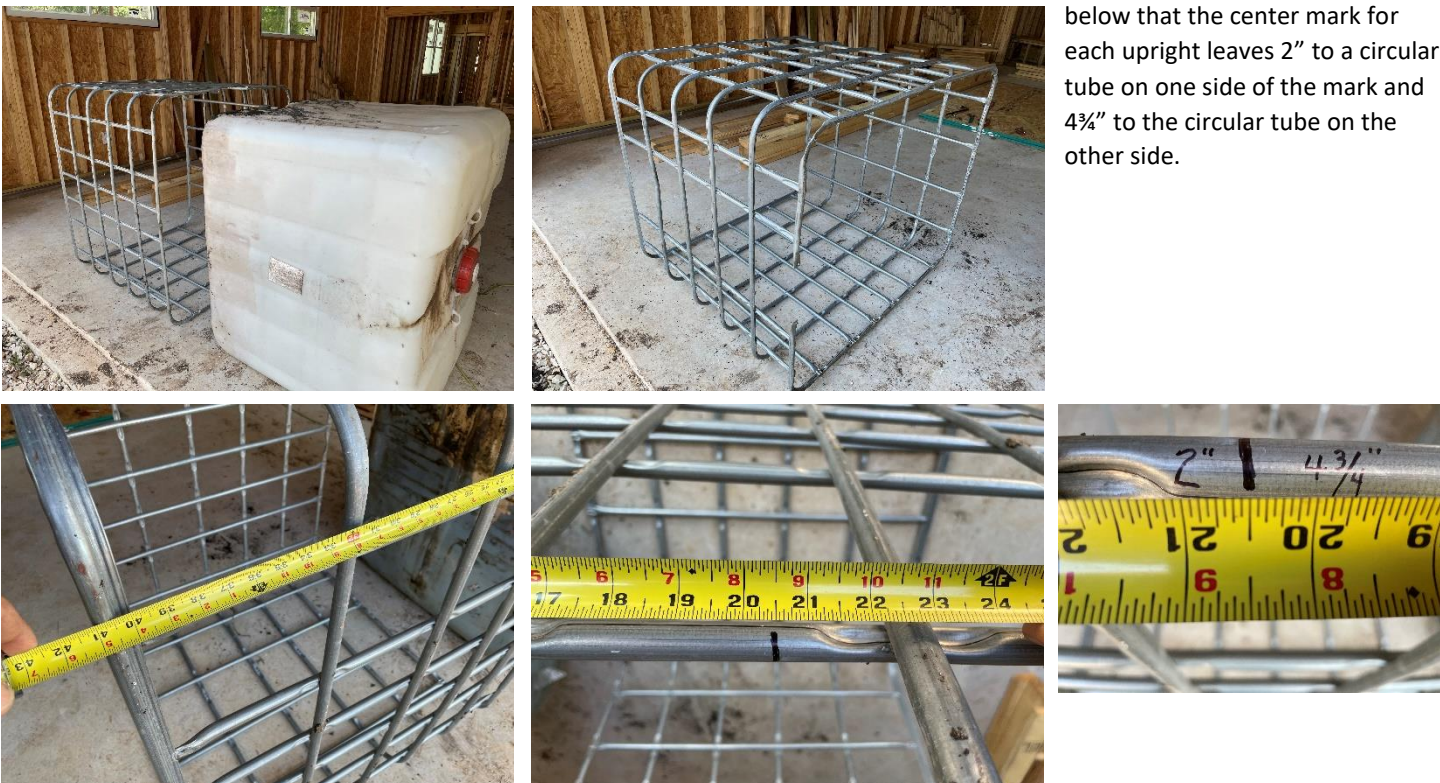
1. Unscrew and remove the two center crossbars at the top of the tote (you'll probably need a star bit). Then remove the screws or bolts that hold the tote cage to the pallet bottom.



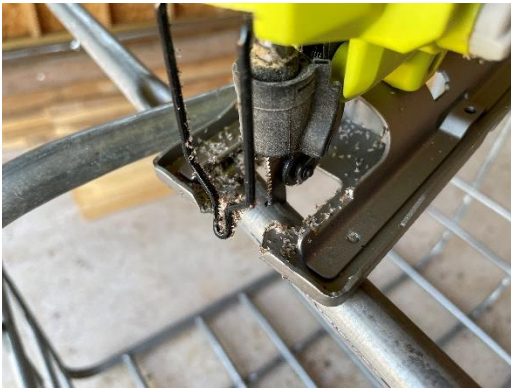
2. Tip the tote on its side, remove and discard the metal pallet, and slide the tote out of the cage. If your cage was wrapped in plastic wrap, such as the one here, remove and discard the plastic wrap. Remove the labeling panel from the cage and discard. I used a crowbar but it comes off easily.



3. With the plastic tote out of the cage, measure carefully and find the middle of the cage (**it is NOT the center of the middle row!**). Mine measured 41 inches so I made my center mark at $21\frac{1}{2}$ " and then marked all the upright tubes. Note in the photo below that the center mark for each upright leaves 2" to a circular tube on one side of the mark and $4\frac{3}{4}$ " to the circular tube on the other side.



4. Once all the uprights are marked, use a metal cutting saw to cut each upright at its half-way mark. Because the plastic totes have round corners, measuring to its center from top to bottom can be tricky. To make the process easier, I hung a large framing square over the edge of the top or bottom with the long end toward the center of the tote. My center was at $19\frac{1}{2}$ ". Make at least two center marks on each side of the tote.



5. Using a long straight edge, mark a line around the entire tote. Before you begin cutting, move the tote to a place where it is safe for any residue contents inside the tote to spill out as you cut around the tote. Some contents, such as the Pepsi product in mine, can make quite a mess as you roll the tote over for the next side's cut. Clean the tote halves.
6. The cap in the top of the tote must be securely attached to the top half of the tote. Later, the top half of the tote will be turned upside down and filled with water so it must be watertight. Place a generous bead of silicone on the top of the threads and then screw the cap tightly onto the tote. If your tote top also has a smaller plug in the center of the cap, use a good coating of PVC cement on both surfaces to secure it tightly in place.



7. Turn each cage half to where the cut ends of the cage are on the ground and then insert the plastic cage halves into each respective supporting metal cage. The smooth ends of the cage will now be at the top and the sharp cut tubes will rest on the ground.
8. Locate a place where you can drill a hole for the overflow pipe. The hole should not be located until AFTER the plastic tote halves are inside their respective metal cage half. If you just arbitrarily mark and drill a hole without the tote halves placed inside their cage, your hole location might conflict with the metal cage tube's location and make it impossible to insert the overflow pipe. Drill a $\frac{7}{8}$ " hole $3\frac{1}{2}$ " up from the actual bottom of the tote.
9. Cut a 3" piece of $\frac{1}{2}$ " PVC and then cut a $\frac{1}{2}$ " PVC elbow in half. CAUTION! When cutting the elbow in half, first place it on a length of PVC to keep your hands away from the saw. Cut the elbow SLOWLY or it will shatter.



10. Use PVC cement and glue one of the elbow pieces to the 3" piece and then insert the 3" pipe through the 7/8" overflow hole. With the 3' piece of PVC inserted into the 7/8" overflow hole, cement the other cut elbow piece to the other end. Later, over the outside piece of elbow, using a zip tie, fold and secure a 4" x 4" piece of window screen over the overflow pipe—this acts as a mosquito prevention device. The PVC pipe will be loose in the hole because we will connect another piece to it on the inside of the tote in later steps.



11. Cut a piece of 1" PVC or larger pipe about 26" long. If you use a piece of pipe less than 1" in diameter a hose end will not fit into it, and that will make filling your wicking garden a bit difficult. Cut one end square and cut a 45-degree bevel on the other, bottom, end—so it will permit water to easily flow into your water reservoir.



12. Cut about a **XXX-foot length** of 4" flexible, perforated sewer drainage pipe.



Make sure the pipe is the perforated kind! With a razor knife cut a hole in the end of the sewer pipe that is about the same size as your fill pipe diameter

13. Also cut a XXX-foot unstretched piece of sewer sock and insert the sewer pipe into the drainage sock. Tie off the coil end of the sewer sock with a zip tie. Note that there will be about 20% of the bottom (center and corners) where soil will later wick water up to your plants. Pull the sewer sock around both the fill pipe and the inside piece of the 3" PVC overflow pipe, then secure it with a zip tie.



14. Fill the tote halves with good garden soil enriched with compost, peat moss, and perlite; making sure you tightly pack the soil to the open bottom areas up to the top of the drainage pipe. The soil could be moist, but not wet. It's good to have lots of crumbly organic matter in the soil which helps with the wicking. Wicking will occur to about 12" to 18" above the height of the water reservoir, depending on the planting medium.
15. Put a hose into the water feeder tube and fill the container's reservoir until you see water running out of the 1/2" overflow tube. Let the barrel wick for 24 hours. Then fill it at least two more times to top off the reservoir. Always stop filling as soon as water runs out of the overflow port.
16. Plant or seed your veggies. If seeding, you will need to surface water until germination occurs and plants are about 3" to 5" tall. Once seeds or transplants are planted and established, cover the soil's surface with straw or mulch.
17. Place a PVC cap (or something else) over the inlet pipe, and a piece of screen over the drainpipe; they serve as barriers to undesirables setting up shop in your unintended mosquito condominium. These are important precautions to take to protect against mosquitos.



Dr. Sunn's growing medium mix: In a wheelbarrow mix 14 shovels of sandy & loamy "garden soil"; 1 bag of *Black Kow*; a 5-gallon bucket of loosened peat moss; a 3-gallon bucket of perlite; and when available, 1 cup of Epsom salt; 2 cups of balanced 13-13-13 fertilizer; two shovels of compost (when available); and 2 cups of coffee grounds/powdered eggshell mix (helps stop blossom end rot in tomatoes, peppers, zucchini, and cucumbers—eggshells are dried in an oven, then mashed into small pieces, using a tenderizing hammer in a metal coffee can, and then they are pulverized in a coffee grinder and mixed with used, dried coffee grounds). All items are mixed in the wheelbarrow and then either fill or top-off my planting containers.

Sources:

- Sandy & loamy "garden soil" – Geosource <https://geosourceinc.com/>
- Peat moss and *Black Kow* – Lowes <https://www.lowes.com/>
- Perlite – South Texas Growers <https://www.southtexasgrowers.com/>
- Epsom salt – Sam's Club <https://www.samsclub.com/>
- Balanced 13-13-13 fertilizer – Bulverde Feed & Seed <https://www.bulverdefeed.com/>
- Used coffee grounds – free at most any coffee shop or restaurant. <https://otgcoffee.com/>, <https://www.starbucks.com/>



Tools needed:

- Star screwdriver bit
- Adjustable wrench
- Hammer or small wrecking bar
- Measuring tape
- Black marking pen
- Scrap piece of straight edge cardboard
- Sabre saw to cut the barrel
- Saw to cut PVC pipe
- Flat drill bit 7/8", sometimes referred to as a *spade* or *paddle* drill bit
- Razor knife
- Caulking gun

Materials list:

- 55 gallon food-grade barrel – any color
- Xx feet of 4" perforated flexible sewer pipe
- Xx linear feet of sewer pipe sock
- Four 10" zip ties
- One 3" piece of 1/2" PVC pipe
- A 90-degree 1/2" PVC elbow cut in half
- PVC cement
- Caulking gun sized tube of clear silicone sealant
- Piece of 1" or larger PVC fill pipe, one end cut square, bottom end cut at 45-degree angle
- Cap for the top of the fill pipe, size is dependent on your fill pipe (mosquito protection on fill pipe)
- One 4" x 4" piece of window screen (mosquito protection on overflow pipe)

Wicking barrel, wicking tub videos:

- <https://www.youtube.com/watch?v=radHBan7-BI>
- <https://www.youtube.com/watch?v=SIAOI995SaQ>
- https://www.youtube.com/watch?v=9guNoWP8_Is&t=632s

<https://www.youtube.com/watch?v=k429cPIH6mM&t=163s>

<https://www.youtube.com/watch?v=E8aE9nd8D4s>

<https://www.youtube.com/watch?v=wGF72sOwgJI>