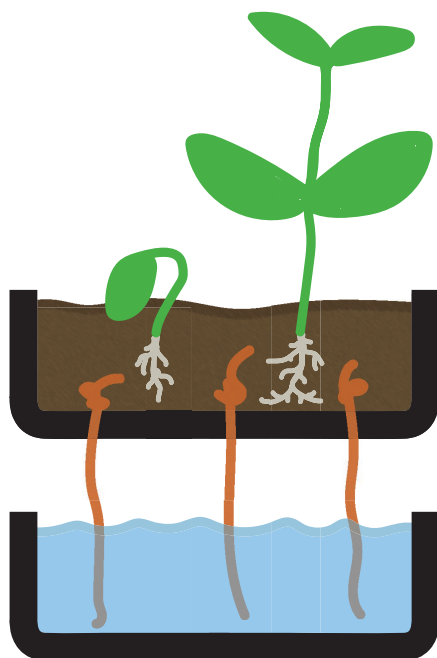


Build a DIY sub-irrigated planter



**a how-to zine
from**

ABBY
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A sub-irrigated planter uses wicking to water your plants from below, keeping them alive and happy. It's easy to make one!

Food is likely to keep getting more expensive for the foreseeable future, so it's worth learning how to grow things yourself. With a self-irrigated planter, you can be more confident that your garden will be a success. Here are some of the benefits:

-  You won't need to water your plants as often.
-  Because you're watering less often, you can grow more plants!
-  Your plants will get a steady stream of moisture, letting them grow to their potential.
-  You'll be able to garden in a small space, like a fire escape or tiny backyard.

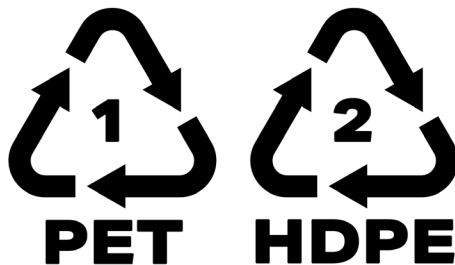
Basic Principles

Sub-irrigated planters use wicking to water plants from below. Wicking, also known as capillary action, is the tendency of liquids such as water to flow through porous materials. SIPs often use twine, string, or cloth as wicking material. Ideally, your potting mix should also act as wicking material.

You'll want to keep your wicking material at the bottom of your planter, in order to encourage healthy root growth. The goal is to encourage your plants' roots to grow downward.

What about leaching?

The two most common plastics used in food packaging are **PET (polyethylene terephthalate)** and **HDPE (high-density polyethylene)**. Soda bottles are typically made of PET, and milk jugs are usually HDPE. Here are their recycling symbols:



HDPE is considered safe for gardening because it doesn't break down under ordinary outdoor conditions (heat, sunlight, moisture). That means it won't leach anything into the soil.

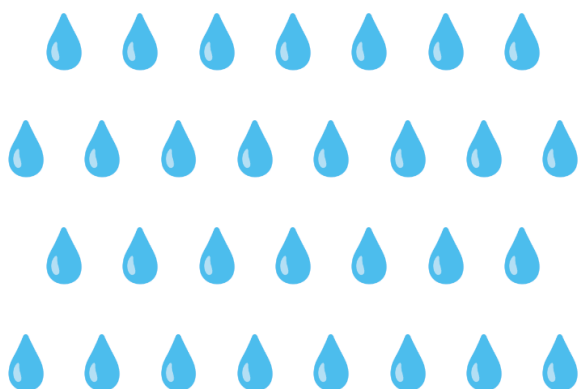
PET, on the other hand, breaks down when exposed to sunlight and/or heat. As it breaks down, it releases chemicals

(phthalates and antimony in particular) that may interfere with our endocrine systems. PET is fine for growing flowers, but you should probably avoid it for growing veggies outdoors.

That said, it should be **OK** to use PET for seed starting! The plastic won't have much time to break down, since you'll only be using it for a few weeks. It won't be excessively hot. And seedlings are tiny, so they can't hold much leached material anyway.

You should **avoid** using **PVC (polyvinyl chloride)** for gardening, because it's toxic. (While we're on the topic, you should wash your hands after handling vinyl records.)

When you're choosing a wicking material, try to stick with natural fibers like cotton and hemp. If you use a wicking material with acrylic fibers, the risk of leaching is greater because there's so much surface area.



Build a plastic bottle SIP

What you'll need:

- ☐ one food-grade plastic bottle (any kind) with cap
- ☐ twine/string made of natural fibers (jute, hemp, cotton, etc.)
- ☐ scissors
- ☐ a box cutter (optional)
- ☐ a marker or grease pencil
- ☐ an awl or a small Phillips screwdriver
- ☐ two 2-inch (5-cm) pieces of stiff wire, such as galvanized steel

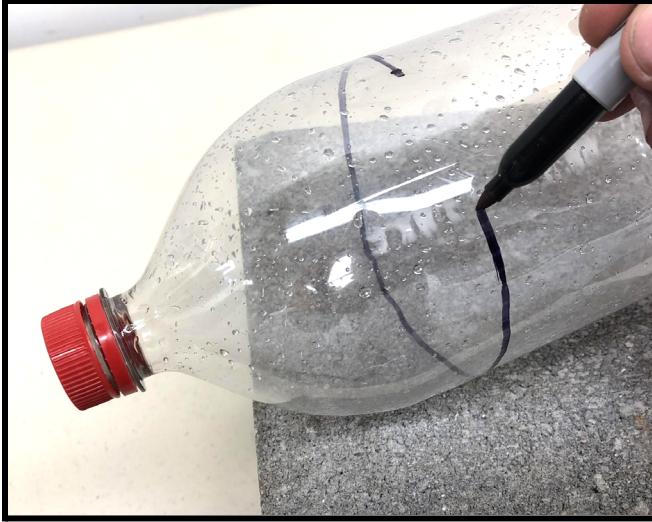
Note: *Be extremely careful when working with sharp tools! Try to keep awls and blades pointed away from you, and away from other people. Pay attention to where your hands are, and where the sharp part might go if the tool slips.*

Steps:

- ☐ Remove the label.
- ☐ Use a marker or grease pencil to make three evenly spaced dots on the cap.



- ❑ Use your marker/grease pencil to make a line around the bottle's circumference, roughly $\frac{1}{3}$ of the way down from the top of the bottle. Your line should be at least 1 inch (2.5 cm) below the shoulder of the bottle.



- ❑ Use your marker/grease pencil to make a pair of dots about $\frac{1}{2}$ inch (1.25 cm) above the line. They should be roughly $\frac{1}{2}$ inch (1.25 cm) apart.



- ❑ Turn the bottle 180 degrees and make a matching pair of dots on the other side.

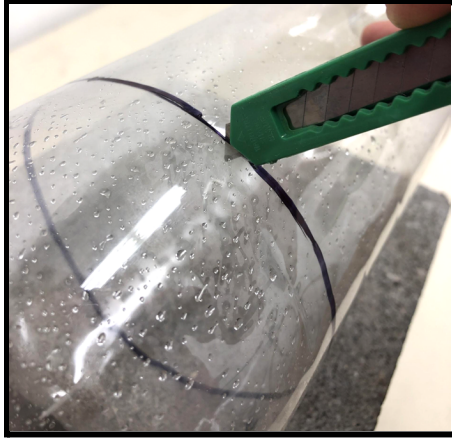


- ❑ Use an awl (or small Phillips screwdriver) to poke a hole in each dot you just made: three in the cap, two on either side of the bottle. Jiggle your tool around to make sure the holes are wide enough.

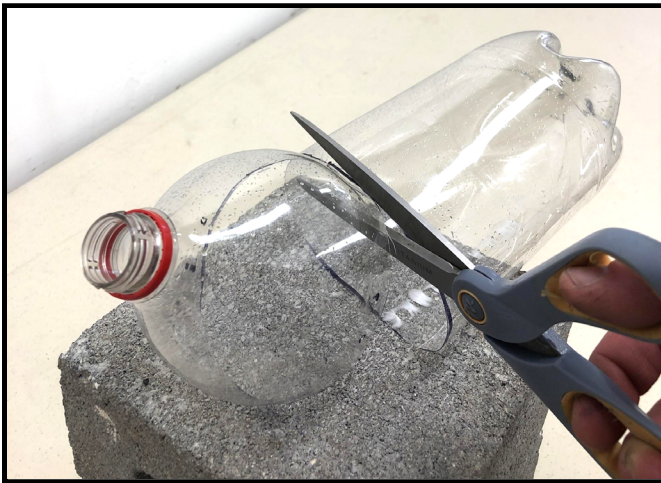


- ❑ Remove the cap from the bottle and set it aside.

- ❑ Use a box cutter to cut a 1-inch (2.5-cm) slit in the line you just drew. If you don't have a box cutter handy, you can use an awl to make a short series of perforations, then pierce with scissors.



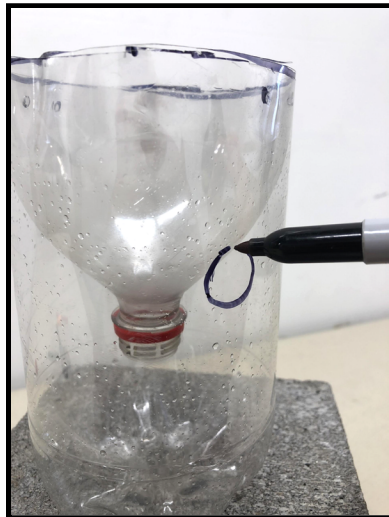
- ❑ Use scissors to cut along the line you just made, all the way around the bottle. Separate the two pieces.



- ❑ Flip the top part of the bottle (the **planter section**) and insert it into the bottom part (the **reservoir section**).



- ❑ Now you'll need to make a hole in the reservoir section where you can add water. Use a marker to make a circle on the side, as high as possible while leaving room to insert the spout of a watering can.



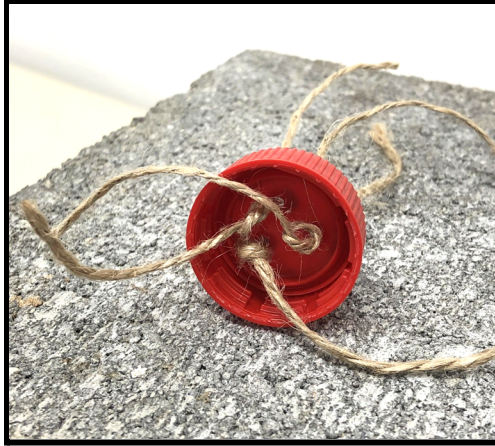
- ❑ Note the distance from the bottom of the planter (where the cap will go) to the bottom of the reservoir. Cut three pieces of twine about 2 or 3 inches (5 or 7.5 cm) longer than that distance.



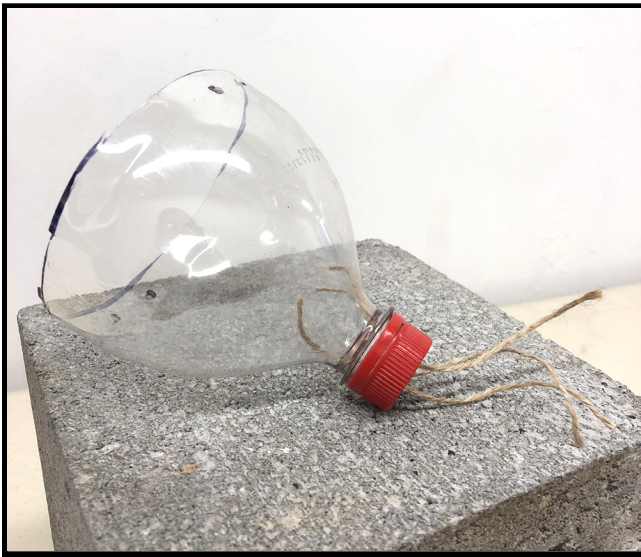
- ❑ Pass a piece of twine through each hole in the bottle cap, from the outside of the cap to the inside. You may need to widen the holes using your awl/screwdriver.



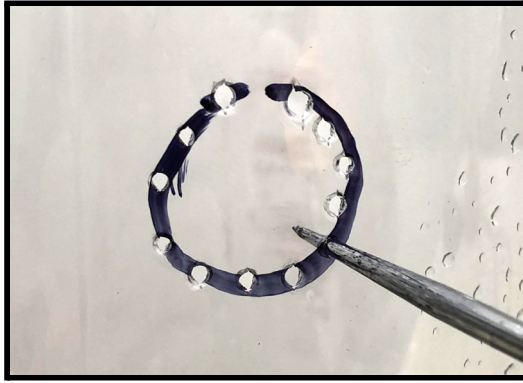
- ❑ Tie a loose knot in each piece of twine, leaving 2 or 3 inches (5 or 7.5 cm) on the inside of the cap. Gently pull each piece of twine so the knot is flush with the cap.



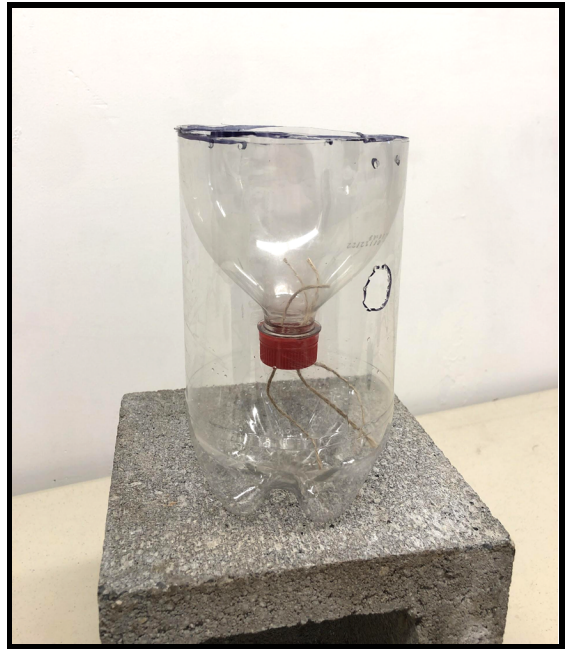
- ❑ Separate your planter and reservoir pieces, and attach the cap to the planter.



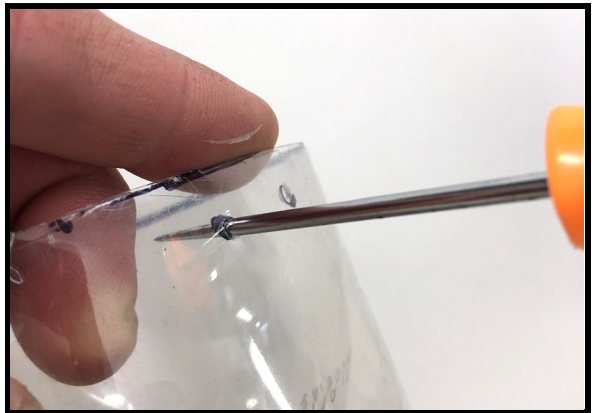
- ❑ Cut a hole in the place you marked earlier on the planter section. Use an awl to create perforations, then use a box cutter or scissors to cut around the circle.



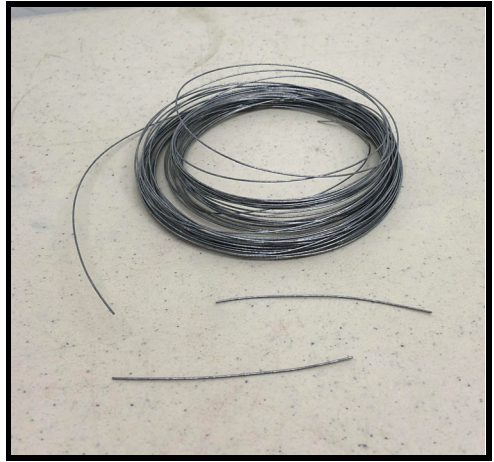
- ❑ Insert the planter section into the reservoir, with the twine hanging down.



- ❑ Find the holes you made earlier in the planter section, and use your awl (or screwdriver) to make matching holes in the reservoir section.



- ❑ Cut 2 pieces of wire, roughly 2 inches (5 cm) each. Galvanized steel wire works well, or you can use twist-ties.



- ❑ Loop a piece of wire through one of the pairs of holes, and twist to secure. Repeat on the other side.



- ❑ Add some water to the reservoir through the hole on the side.

- ❑ Put a little potting mix in the bottom of the planter, surrounding the 3 pieces of twine.



- ❑ Add more potting mix to fill the planter.



- ❑ Plant your seeds!
- ❑ Water normally from the top for a few days to a week, also keeping the water reservoir full. After that, you'll just need to add water to the reservoir every few days.

Nice work!



Build a 4-bottle SIP reservoir



This design uses 4 HDPE jugs linked together. It works with plastic milk jugs (half gallon or gallon), or whatever other HDPE bottles you have handy. You won't need to use tape or adhesives for this design.

You can also use PET bottles, such as 2-liter soda bottles, but you shouldn't use them to grow food.

You'll be able to cover this reservoir with about 6 inches of soil; if you bury it deeper, the plastic jugs may collapse under the weight. If you want, you can add stones (such as river stones) to each jug to support the reservoir in case it collapses.

What you'll need:

- ☐ four plastic jugs made of HDPE (recycling code 2), such as milk containers
- ☐ cotton rope (or twine, or strips of cloth)
- ☐ scissors
- ☐ a box cutter (optional)
- ☐ a marker or grease pencil
- ☐ an awl or a small Phillips screwdriver
- ☐ a large screwdriver or ballpoint pen
- ☐ a planter or plastic tote large enough to fit your finished reservoir
- ☐ a section of pipe for adding water to the reservoir, ideally made of HDPE or a natural material like bamboo

Steps:

- ❑ Clean each bottle thoroughly with warm water, using dish soap if needed. Any remaining food residue can attract mold.
- ❑ Turn your bottles on their sides and arrange them in this configuration:



- ❑ Use a marker or grease pencil to make a circle on top of one of the jugs, where you'll connect a pipe to add water to the reservoir.



- ❑ Use an awl to poke six holes (or so) in the top of each bottle, steering clear of the circle you just made. Then use a screwdriver to widen each hole to about 1/3 inch (0.85 cm).

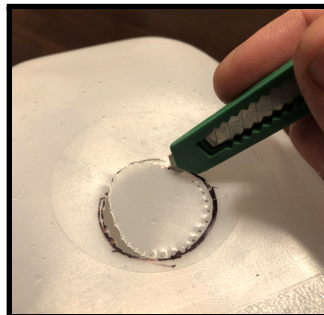
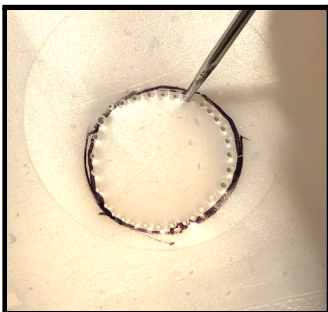
In the example project, two holes in each bottle will be used for wicking material. The rest are for airflow.



- ❑ Line up the mouth of one bottle with the side of another, and use a marker or grease pencil to trace a circle where they'll connect.



- ❑ Just inside the circle you just created, make a circle of perforations with your awl. Then use a box cutter or scissors to cut around the circle. Try to make the hole perfectly round, with clean edges.



- ❑ Insert the neck of a jug into the hole you just made, twisting if necessary to get it into place. You may need to widen the hole with a box cutter or scissors.



- ❑ Repeat the process for the remaining three jugs, fitting them together in a square pattern.



- ❑ Cut a piece of cotton rope long enough to reach from the top of the reservoir to the bottom, plus 4–5 inches (10–13 cm) to stick out on top.



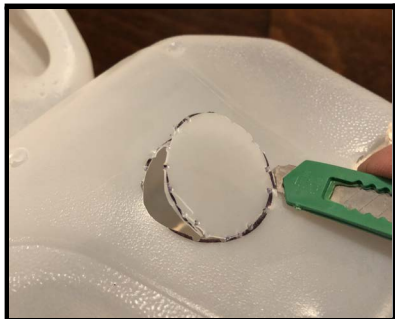
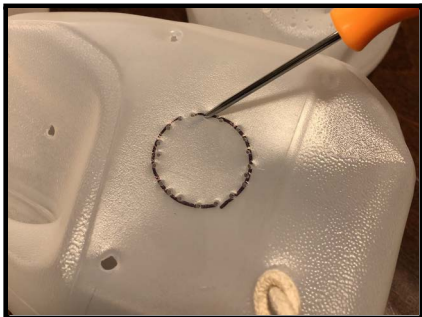
- ❑ Cut 7 more pieces of rope, all the same length. Tie a loose knot in each one, about 4–5 inches (10–13 cm) from one end.



- ❑ Take a piece of knotted rope and insert the long end into a hole on top of one of the jugs. Repeat with the rest of your rope pieces, distributing them evenly among the jugs.



- ❑ Cut a hole for your refill pipe, using the circle you marked earlier.



- ❑ Insert your refill pipe into the hole.



- ❑ Find a planter or plastic tote large enough large enough to fit your reservoir. Your planter should have a hole at the bottom for drainage. Place your SIP reservoir at the bottom of the planter.
- ❑ Start adding potting mix around your reservoir, and make sure the rope ends are pointing up.
- ❑ Add more potting mix and plant your seeds/transplants.
- ❑ Water from the top for a week or so, while also keeping the reservoir full. After that, you'll only need to refill the reservoir every week or so.

Your sub-irrigated planter is ready to go. Great job!

Credit

Interlocking reservoir design adapted from the following guide by ikewulf on Imgur: <https://imgur.com/a/Cyfd8>

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