# How to Grow Hydroponic Tomatoes

Expert Reviewed

Three Parts: Setting Up a Hydroponics System Growing the Tomatoes Creating Good Growing Conditions

Hydroponic tomatoes are grown in a nutrient solution rather than soil, although they are typically placed in a non-soil material that can support their roots and hold the nutrients. Growing tomatoes hydroponically allows the grower to raise them in a controlled environment with less chance of disease, faster growth, and greater fruit yield. However, hydroponic gardening is much more labor intensive, and sometimes more expensive, than ordinary tomato planting, especially if you have not set up or run a hydroponics system before.

## Part 1 Setting Up a Hydroponics System

**1** **Decide which type of system to use.** There are several varieties of hydroponic systems, and tomatoes can grow well in any of them. The instructions in this section will teach you how to construct an **ebb and flow** system, which is relatively cheap and easy to build. This system is also known as a flood and drain system because it floods the plants with nutrient solution and then the solution drains when it is about two inches from the top of the container.[1]

**Alternatives:**
**Deep water culture:** simple system for cherry tomatoes and other small plants.[2]
**Multi flow:** a larger version of the ebb and flow that relies on gravity. Difficult to build, but supports more plants.
**Nutrient film technique (NFT):** Suspends the plants with roots brushing against slope of trickling nutrients. Slightly more finicky and expensive, but preferred by some commercial growers.

- **Note:** Hydroponics stores and home improvement stores may sell a hydroponics kit which includes everything you need to set up your system. Alternatively, you can purchase each component separately, or even find some of them around your house. Clean secondhand or previously used components thoroughly before building the hydroponics system.

**2** **Find a suitable location.** Hydroponics systems are only suitable for indoor or greenhouse environments. They require precise control to function properly, so they should be set up somewhere closed off from other rooms and from the outside. This allows you to set the temperature and humidity to accurate levels needed for best growth.

- It is possible to grow hydroponics using natural light, but keep the system under a glass or polyethylene covering such as a greenhouse roof, not open to the air.

**3** **Fill a large, plastic container with water to use as a reservoir.** Use a plastic container that does not let in any light to prevent the growth of algae. The larger this reservoir, the more stable and successful your hydroponics system will be. Each tomato plant requires about 2.5 gallons of nutrient solution.[3] However, many factors can cause the tomato plants to use water faster, so it is recommended that you use a container that can hold *double* the minimum amount of water.[4]

- You may use a plastic bucket or trash can for this purpose. Use a brand-new one to prevent any contamination of the system, or at least a lightly-used one thoroughly scrubbed with soapy water and rinsed.
- Collected rainwater may be better suited for hydroponics than tap water, especially if your tap water is especially "hard" with high mineral content.[5]

**4** **Fix a tray in place above the reservoir.** This "ebb and flow tray" will support your tomato plants, and will be periodically flooded with nutrients and water that the tomato roots will absorb. It must be sturdy enough to hold up your plants (or be placed atop additional support), and placed higher than your reservoir to allow excess water to drain

down into it. These are typically built of plastics, not metal, to avoid corrosion that could affect the plants and wear out the tray.

**5** **Install a water pump inside the reservoir.** You can purchase a water pump at a hydroponics store, or use a fountain pump found at home improvement stores. Many pumps will have a chart listing the water flow at different heights. You may use this to find a pump strong enough to send water from the reservoir to the tray containing the plants. The best course of action, however, may be to pick a powerful, adjustable pump and experiment with the settings once you have your system set up.

**6** **Install fill tubing between the reservoir and the tray.** Using 1/2 inch (1.25 cm) PVC tubing, or the type of tubing that came in your hydroponics kit, attach one length of tubing between the water pump and the tray, so the tray can be flooded to the height of the tomato plant roots.

- Position the inlet and outlet pipes at opposite ends of the tray to promote water circulation.

**7** **Install an overflow fitting leading back to the reservoir.** Attach a second length of PVC tubing to the tray with an overflow fitting, located at a height at the bottom of the roots.[6] When the water reaches this level, it will drain back through this tube and into the reservoir.

- Keep in mind that the overflow tube should be larger in diameter than the inlet tube from the pump to avoid flooding.[7]

**8** **Attach a timer to the water pump.** A simple timer intended for light fixtures can be used to power the water pump at regular intervals. This needs to be adjustable so you can increase or decrease the amount of nutrients delivered depending on the plants' stage of life.

- A heavy duty 15-amp timer with waterproof cover is recommended.[8]
- Any water pump should have a way to attach a timer, if it doesn't come with one already, but the exact instructions vary by model. Ask the manufacturer if you are having trouble with this step.

**9** **Test the system.** Turn on the water pump and see where the water goes. If a stream of water fails to reach the tray, or if excess water spills over the edges of the tray, you may need to adjust the settings of your water pump or you may need to adjust the size of your drain pipe. Once you have the water set to the correct strength, check the timer to see if it sets the pump going at the specified times.

## Part 2 Growing the Tomatoes

**1** **Grow tomato seeds in a special material.** Raise your tomato plants from seed whenever possible. If you bring plants in from the outdoors, you may introduce pests and diseases to your hydroponics system. Plant seeds in a nursery tray with a special growing material for hydroponics, instead of ordinary soil. Before using, soak the material with pH 4.5 water, aided by a pH test kit from a garden store. Plant the seed under the surface, and keep under plastic domes or other transparent material to trap moisture and encourage the seeds to sprout.

> **Growing materials:**[9]
> **Rock Wool:** excellent for the tomatoes, but wear a mask and gloves to avoid irritation.
> **Coconut coir:** excellent choice, especially when mixed with clay "grow rocks." Low-quality products may require rinsing due to salt content.
> **Perlite:** cheap and moderately effective, but washes away in an ebb and flow system. Best in a mix with 25% vermiculite.

**2** **Place seedlings under artificial light once they sprout.** As soon as the plants sprout, remove the covering and place the seedlings under a light source for at least 12 hours a day.[10] Only use incandescent light bulbs as a last resort, as these produce more heat than other options.

- See the section on hydroponics system setup to learn about grow light options.

- Take care not to let the light shine on the roots to avoid damaging them. If roots are protruding from the starter material before they are ready to transplant, you may need to soak additional starter material and use it to cover them.

**3** **Move seedlings into the hydroponic system.** Wait until their roots start to protrude from the bottom of the nursery tray, and the first "true leaf" has grown, larger and different in appearance than the first one or two "seed leaves". This usually takes 10–14 days.[11] When you move them into the hydroponics system, you may place them at 10 to 12 inch intervals in a layer of the same material, or transfer them to individual plastic "net pots" containing the same material.

- If using the ebb and flow system described in this article, the plants are placed on the tray. Other systems may call for the plants to be placed in a trough, along a slope, or wherever the water and nutrients can reach the roots.

**4** **Set the water pump timer.** To begin with, try setting the pump to run for 30 minutes every 2.5 hours. Do not go more than 2.5 hours without running the pump.[12] Keep an eye on the plants: you'll need to increase the watering frequency if they begin to wilt, and decrease it if the roots become slimy or soaked. Ideally, the material the plants are in should just barely dry out when the next watering cycle comes along.

- Even once the watering cycle is established, you may need to increase the watering frequency once the plants begin to bloom and fruit, since these processes require additional water.

**5** **Set your artificial lights (if applicable).** For ideal growing conditions, expose growing tomato plants to between 16 to 18 hours of light a day. Then turn off the lights and let them sit in total darkness for about 8 hours. The plants will still grow if you are relying on sunlight, but will likely grow more slowly.

**6** **Stake and prune tall tomato plants.** Some tomato plants are "determinate," meaning they grow to a specific size, then stop. Others continue to grow indefinitely, and may need gently tying to a stake in order to grow upright. Prune them by breaking off stems with your hands rather than cutting them off.

- Keep in mind that even though determinate tomatoes will grow without staking, there is a risk of lower yields if you do not stake the plants upright. When the plants set fruit, they may droop and come into contact with the growing medium.

**7** **Pollinate the tomato plant blossoms.** When the tomato plants bloom, since there are no insects in your hydroponics environment to pollinate them, you will need to do it yourself. Wait until the petals bend back to expose the round pistil and the pollen-covered stamens, or long, thin sticks at the flower center. Touch a soft paintbrush to each of the pollen-covered stamens, then touch the rounded end of the pistil. Repeat daily.

## Part 3 Creating Good Growing Conditions

**1** **Control the temperature.** During "daylight" hours, the air temperature should be 65 to 75 degrees Fahrenheit (18 to 24 C). At night it should be 55 to 65 °F (12.8 to 18.3 °C).[13] Use thermostats and fans to regulate the air temperature. Monitor the temperature while the plants grow, as it could change with the climate or tomatoes' life cycle.

- Pay attention to the growing solution temperature as well. This should be between 68 to 72 degrees Fahrenheit. However, you do not need to keep it exactly within this range. If it goes slightly outside of it, then that is fine. Just avoid letting the growing solution temperature go below 60 degrees Fahrenheit or above 80 degrees Fahrenheit.[14]

**2** **Run a fan in the room (optional).** A fan that exhausts to the outside or another room may help keep the temperature even throughout the room. The air flow it creates may also make pollination easier, although to be certain of growing fruit you may wish to pollinate by hand anyway, as described below.

**3** **Add a nutrient solution to the reservoir of water.** Choose a nutrient solution made for hydroponics, not ordinary fertilizer. Avoid "organic" solutions, which may decompose and make caring for your system more complicated.[15] Because the needs of your system vary with tomato variety and mineral content of your water, you may need to adjust the amount or type of nutrient solution you use. To begin with, however, follow the instructions on the packaging to determine how much you need to add to the reservoir.

- Two part nutrient solutions create less waste and can be adjusted if problems arise simply by mixing them in different amounts, making them preferable to one-part solutions.[16]
- You may wish to use a growth-focused formula while the tomatoes grow, then switch to a bloom formula once they flower to meet their new nutrient needs.

**4** **Use a pH test kit to test the water.** Use a pH test kit or litmus paper to test the pH of your nutrient and water mix once it's had time to become an even mixture. If the pH is not within the range of 5.8–6.3, ask a hydroponics store or gardening store employee about materials that can be used to lower or raise the pH. You can adjust the pH with acidic or basic additions to the reservoir.

- Phosphoric acid can be used to lower pH, while potassium hydroxide can be used to raise it.

**5** **Install grow lights (recommended).** Artificial "grow lights" will allow you to simulate ideal growing conditions year round, providing your tomatoes with many more hours of "sunlight" than the garden outside may be receiving. This is one of the major benefits of an indoor growing system. However, if you are using a greenhouse or other area that receives high amounts of natural light, you may accept a shorter growing season and save money on electric bills.

- Metal halide lamps simulate sunlight most accurately, making them a popular choice for hydroponics systems. Fluorescent, sodium, and LED grow lights are also available, but may cause slower or differently shaped growth. Avoid incandescent lights, which are inefficient and short-lived compared to other options.[17]

**6** **Monitor the water regularly.** An electrical conductivity meter or "EC meter" may be expensive, but it is the best way of measuring the concentration of nutrients in the water. Results outside the range of 2.0–3.5 indicate that the water should be changed or partially changed. EC meter testing works best if you are using a two part fertilizer. If you do not have an EC meter, look for the following signs in your tomato plants:[18]

- Leaf tips curling downward may mean the solution is too concentrated. Dilute with pH 6.0 water.
- Leaf tips curling upward or a red stem suggest the pH is too low, while yellow leaves indicate the pH is too high or the solution is too dilute. In any of these scenarios, change the solution as described below.

**7** **Change the water and nutrient solution regularly.** If the water level in the reservoir drops, add more water, but do not add more nutrients. Every two weeks, or once a week if your plants do not look healthy, empty the reservoir completely and rinse the support material and roots of the tomato plants with pure, pH 6.0 water to leach away mineral buildup that could cause harm.[19] Fill the reservoir with a new water and nutrient solution, making sure to balance the pH and let the mixture become even before you start the water pump.

- You may use the water used for leaching to water regular garden plants.

## Community Q&A

**Are pesticides necessary for growing hydroponic tomatoes?**

Andrew Carberry

Because they are in a more controlled (indoors) environment, there is less need for pesticides with hydroponic tomatoes.

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**Can you suggest something all natural instead of my adding chemically-based nutrients to the plants?**

wikiHow Contributor

Look into aquaponics systems. Instead of using chemically-based nutrients, you just recycle waste water from a fish tank to provide the nutrients you need.

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**How does this work? Why doesn't the plant drown?**

wikiHow Contributor

The plant doesn't drown because the water is allowed to drain from the plants and medium in the main container into the reservoir below. This allows the plants to receive water and nutrients, but also ample amounts of air. For example, most rockwool mediums are comprised of more than 80 percent air after the nutrient water is allowed to drain. This is because of the many microfibers that make up the rockwool being perfect for retaining water, but allowing it to drain quickly and pull air into the medium as water flows out of the fibers.

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**Can you add too much water to tomatoes when growing?**

wikiHow Contributor

As long as the plants are allowed to thoroughly drain it is difficult to overwater plants in a hydroponic system. That being said, you can run into problems if the plants are watered too often or if the plants are left soaking in the water instead of being properly drained.

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**Doesn't the outflow tube need to reach down to the bottom of the tube so that it will fully drain the tub?**

wikiHow Contributor

That is correct. There is a mistake in the drawing of Step 9: the "overflow PVC tube" should not be so short (as shown on that picture) but long enough to go down to the bottom of the tray. That way, when the tray is full, it will automatically make a "siphon" and empty the tray totally, thus avoiding drowning the roots.

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## Things You'll Need

- [ ] Large plastic container
- [ ] PVC tubing
- [ ] Plastic "ebb and flow" tray
- [ ] Water pump
- [ ] Grow lights (e.g. metal halide lights) (recommended)

- [ ] Two powered timers (one for the pump, one for lighting)
- [ ] Tomato seeds
- [ ] Rock wool
- [ ] Net pots or other pots that allow water through
- [ ] Nutrient solution
- [ ] pH test kit
- [ ] Potassium hydroxide (or other pH raising substance)
- [ ] Phosphoric acid (or other pH lowering substance)
- [ ] Thermostat
- [ ] Fans
- [ ] Paint brush
- [ ] Stakes and ties

## Sources and Citations

1. http://www.homehydrosystems.com/hydroponic-systems/ebb-flow_systems.html
2. http://www.simplyhydro.com/home_grow_tomatoes.htm
3. http://www.homehydrosystems.com/system_plans/Other%20Hydroponics%20Related%20Designs/Tips%20for%20Growing%20Plants%20in%20Hydroponic%20Systems/Tips%20for%20Growing%20Plants%20in%20Hydroponic%20Systems.html

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