

A Selective Overview of Hydroponic Methods

There is no best way for everyone to garden. In fact, many growers combine many of the listed techniques in one system. When choosing hydroponic methods, the challenge is to match your skills with the crop being grown. It is important to have realistic goals. Use hydroponics to achieve maximum output with minimum input of your own energy. Focus on growing healthy plants that favor your environment. Don't forget that, if you are doing indoor gardening, it is essential to maintain a proper plant environment.

1. Passive Method (No Power Needed)

Passive systems rely on capillary action, absorption and/or gravity (examples: the AutoPot[®] Easy2Grow system, Wick systems, hand watering). In passive systems there are no moving parts. For example, the Wick system uses a variation of drip feeding, except that the plant draws water by means of a wick. The wick runs from the base of the plant container down to a reservoir of nutrient solution. The solution travels up the wick into the plant through capillary action. Coco and perlite growing media work well with passive systems. Since the passive method requires no power, reservoirs can be left unattended for weeks. Thus, the passive method is ideal for conservation of energy and for remote locations.

2. Active Method (Power Needed)

Active systems employ pumps and other devices to cycle and deliver the nutrient solution to the root zone:

a. Water Culture

Of all the soil-less methods, water culture, by definition, is true hydroponics. Water culture includes aeroponics.

DWC (Deep Water Culture or Continuous Aeration Technique): Actually, you can choose whether to make a bucket system or purchase a DWC system. With this self-contained method, plants are suspended above the water level, and a submersible air pump is used with air stones to constantly bathe the roots in aerated nutrient solution. (For that matter, one should always aerate the water supply — whether it is to the reservoir or root zone — in any system.) As plants mature, the roots grow into the continuously circulating reservoir. The container holding the roots and aerated solution must be completely light-proof in order to prevent algae growth. The solution must also be topped off from time to time. This system is very easy to maintain and incorporate into any size of garden.

Aeroponics: (Small Aeroponic units like the AeroGarden are very popular for cuttings and fast harvesting of plants.) This culture is now widely used in lab studies but is not commonly used as a commercial application.

Aeroponics is a system in which the roots are suspended in air, with a mist or fog of nutrient-rich solution and without the use of a growing medium. Exceptional root growth is made possible, since the roots grow directly in this highly oxygenated nutritional solution. Because roots have unlimited access to oxygen, water and nutrients, the entire plant can grow at a phenomenal rate. Aeroponic systems have a smaller margin of error and are recommended for more experienced gardeners.

Traditional aeroponic techniques use pumps and misters more commonly found in micro-irrigation systems, whereas state-of-the-art techniques employ ultrasonic nebulizers that convert the nutrient solution into an extremely fine fog. Fogponics is an ideal means of providing upper roots with a nutrient-enriched fog that penetrates deeply into root tissue, keeping it moist, well-nourished, and free from decay. Cuttings root faster with fogponics than with any other method. For this reason, many top growers combine fog machines with aero and drop systems. People can build their own fogponics machines with proper direction.

b. Ebb and Flow (Flood and Drain)

This technique is very popular, has a proven track record for low maintenance, and is easy to use for gardens. There are many styles of Ebb and Flow systems from which to choose. They are versatile, simple by design, and very efficient. Be sure to start with a good pump.

The Ebb and Flow (Flood and Drain) technique is basically a sub-irrigation method. Its style of recirculation uses a pump timer to raise the solution to moisten the roots and then allow the solution to recede. The process is repeated throughout the day. The frequency and duration of the flood depends on factors like the size and type of plants and growing media. A typical flood cycle lasts for 15 minutes and occurs every 2 to 4 hours during daylight hours. Roots are nourished and aerated as the cycle repeats, flushing the medium. The most commonly used grow media for Ebb and Flow gardens are rockwool, perlite, vermiculite and lava rock. This system works best with small plants and bushes that have large, established root systems — such as herbs and flowers — and, based on reservoir size, is typically used in smaller setups. Plants difficult to grow with this system include potatoes, berries and bulb-based flowers. This system can be very fun to build, with great results. Remember to aerate the water supply.

c. Drip (Medium Needed)

A Drip system (recovery and non-recovery) is a substrate system where a pump delivers solution from a main reservoir to drip emitters positioned at the base of each plant via individual supply lines. Depending on the medium, some systems will drip continuously; others are set on a timer to drip 15 minutes every 2 to 4 hours during the day. Drip systems that use a rockwool or stonewool medium give you the most “margin of error,” since these media retain water incredibly well. Drip systems can be fine-tuned in conjunction with temperature and humidity to create a nearly continuous feed cycle that pours lots of nutrients and water into plants to produce growth. A Drip system is great for growing vine crops (includes the Dutch Bucket system). It works best for smaller plants and is ideal for plants that don’t yet have a developed root system, but it can be combined with aeroponics or fogponics to promote many possibilities.

d. NFT (Mostly Recommended for Commercial Production)

NFT (Nutrient Film Technique) is excellent from start to finish for leafy greens like lettuce. NFT is a bare-root system in which nutrient solution is constantly pumped over plant roots at a depth of 1/4 inch to 1/2 inch. This forms a thin film of nutrients, giving roots simultaneous access to nutrients and air. The solution cycles between the main reservoir and the grow channel (or gully), which is tipped at a slight angle to create the desired film effect and prevent roots from “damming” the channels. A downside of the technique is that it has very little buffering against interruptions in the flow (power outage). While NFT is high-maintenance and temperamental, it is very productive and is suitable for larger commercial applications. This technique works well with plants that have large, established root systems — such as tomatoes, cucumbers, potatoes and berries.

Conclusion

Remember that the preceding overview is only a selection of common hydroponic techniques. The varieties of hydroponic methods are virtually endless. For example, today vertical gardens are changing the way we use space just as superior organic nutrients are changing our growing technology.

— Chris Mathewson
HomeLife® Hydroponics & Organics