



Introduction to Hydroponics

What is Hydroponics?

The word hydroponics has its' roots in the Greek language. "Hydro" in Greek meant water, and the word "ponos" meant labor. Literally, hydroponics means 'water-working.' For us, hydroponics is a technological method of growing plants without the use of soil.

How do Hydroponic Gardens Work?

Hydroponics does not use soil, instead the root system is supported using an inert medium such as perlite, rockwool, clay pellets or vermiculite. The basic premise behind hydroponics is to allow the plants roots to come in direct contact with the nutrient solution, while also having access to oxygen, which is essential for proper growth.

What are the Advantages to Growing Plants Hydroponically?



Growing with hydroponics comes with many advantages, the biggest of which is a greatly increased rate of growth in your plants. With the proper setup, your plants will mature up to 25% faster and produce up to 30% more than the same plants grown in soil.

Your plants will grow bigger and faster because they will not have to work as hard to obtain nutrients. Even a small root system will provide the plant exactly what it needs, so the plant will focus more on growing upstairs instead of expanding the root system downstairs.

All of this is possible through careful control of your nutrient solution and pH levels. A hydroponic system will also use less water than soil-based plants because the system is enclosed, which results in less evaporation. Believe it or not, hydroponics is better for the environment because it reduces waste and pollution from soil runoff. And you don't have to worry about pests and weeds.

What are the Disadvantages to Growing Plants Hydroponically?

Despite the fact that a hydroponics system has so many advantages, there are actually a few disadvantages as well. The biggest factor for most people is that a quality hydroponics system of any size will cost more than its soil counterpart.

A large-scale hydroponics system can take a lot of time to setup if you aren't the most experienced grower. Plus, managing your hydroponics system will take a lot of time as well. You will have to monitor and balance your pH and nutrient levels on a daily basis.

Disadvantages continued

The greatest risk with a hydroponics system is that something like a pump failure can kill off your plants within hours depending on the size of your system. They can die quickly because the growing medium can't store water like soil can, so the plants are dependent on a fresh supply of water.

Types of Hydroponic Systems

The cool thing about hydroponics is that there are many different types of hydroponics systems available. Some of the best hydroponic systems on the market combine different types of hydroponics into one hybrid hydroponic system. Hydroponics is unique in that there are multiple techniques you can use to get the nutrient solution to your plants.

Deepwater Culture



Deepwater Culture (DWC), also known as the reservoir method, is by far the easiest method for growing plants with hydroponics. In a Deepwater Culture hydroponic system, the roots are suspended in a nutrient solution. An aquarium air pump oxygenates the nutrient solution, this keeps the roots of the plants from drowning.

Remember to prevent light from penetrating your system, as this can cause algae to grow and use up all the nutrients.

The primary benefit to using a Deepwater Culture system is that there are no drip or spray emitters to clog. Once the system is set up, it basically requires no maintenance until harvest time. Lettuces and herbs do very well in this system.

Nutrient Film Technique

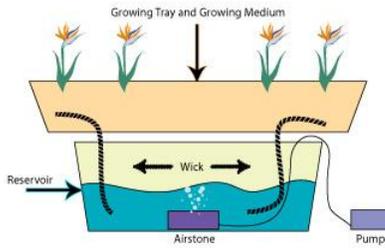


Nutrient Film Technique, or NFT, is a type of hydroponic system where a continuous flow of nutrient solution runs over the plants roots. This type of solution is on a slight tilt so that the nutrient solution will flow with the force of gravity.

This type of system works very well because the roots of a plant absorb more oxygen from the air than from the nutrient solution itself. Since only the tips of the roots come in contact with the nutrient solution, the plant is able to get more oxygen which facilitates a faster rate of growth.

The downside is that only small plants such as lettuces and herbs can be grown.

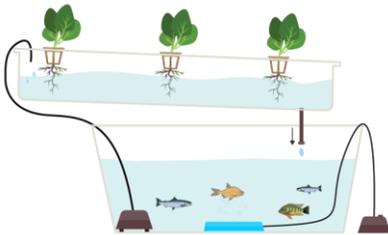
Wick System



Wicking is one of the easiest and lowest costing methods of hydroponics. The concept behind wicking is that you have a material, such as a cotton string, that hangs down from the growing medium into the nutrient solution. The solution is then wicked to the roots of the plant.

We recommend using a medium such as perlite or vermiculite. Avoid using mediums such as Rockwool or peat moss because they may absorb too much of your nutrient solution which can suffocate the plant.

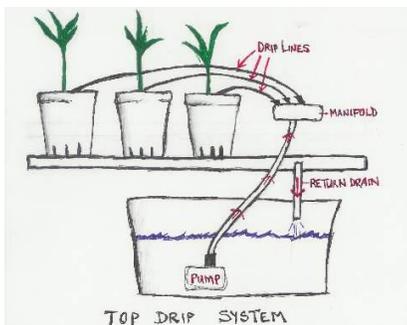
Aquaponics



Literally speaking, Aquaponics is putting fish to work. It just so happens that the work those fish do (eating and producing waste), is the perfect fertilizer for growing plants. And fish can grow a lot of plants when they get to work!

One of the coolest things about Aquaponics is that it mimics a natural ecosystem. Aquaponics represents the relationship between water, aquatic life, bacteria, nutrient dynamics, and plants which grow together in waterways all over the world. The fish waste falls to the bottom of the tank, becoming food for the beneficial bacteria. The bacteria then converts it into a perfect fertilizer for the plants who filter and return the water to the fish. Just like mother nature does in every aquatic ecosystem.

Drip System



A hydroponic drip system is rather simple. A drip system works by a reservoir and pump that provides a slow feed of nutrient solution to the plants in the medium. We recommend using a fast draining medium, such as perlite. Nutrient solution is dripped onto the plants several times per day for short intervals.

The downside to a system like this is that the drippers are famous for clogging. Many prefer not to use drip systems, but it can be an effective method for growing if you can avoid the clogs that plague this type of system. The positive side is that one can grow much larger plants such as peppers, tomatoes, Brussel sprouts and broccoli.



Hydroponics Worksheet

1. What is the origin of the word HYDROPONICS? _____

2. Hydroponic gardens do not use _____, but instead, the roots come into direct contact with

3. List two advantages and two disadvantages of growing vegetables hydroponically.

Advantages _____

Disadvantages _____

4. List three mediums that can be used instead of soil: _____

5. List the five types of systems and a short description of each with 2 bullet points.

SUMMARIZE- do not copy

A. _____

B. _____

C. _____

D. _____

E. _____



6. Why are bubblers (aerators) used in deep water culture? _____

7. What two systems could you use to grow lettuce for your salad? _____

8. What is the best system for growing tomatoes? _____

9. Why is algae a problem? _____
