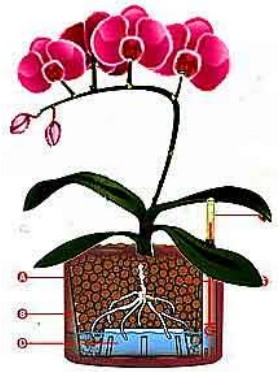
Introduction to Hydroponics

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. Then again, dirt isn't exactly expensive and you get what you pay for.

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.

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. This will wreak havoc on your system.

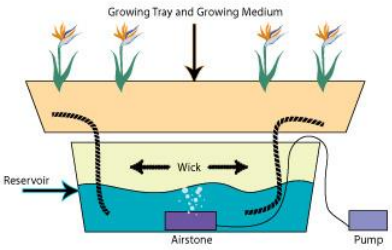
The primary benefit to using a Deepwater Culture system is that there are no drip or spray emitters to clog. This makes DWC an excellent choice for organic hydroponics, as hydroponics systems that use organic nutrients are more prone to clogs.

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.

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 cotton, that is surrounded by a growing medium with one end of the wick material placed in the nutrient solution. The solution is then wicked to the roots of the plant.

This system can be simplified by removing the wick material all together and just using a medium that has the ability to wick nutrients to the roots. This works by suspending the bottom of your medium directly in the solution. We recommend using a medium such as perlite or vermiculite. Avoid using mediums such as Rockwool, coconut coir, or peat moss because they may absorb too much of your nutrient solution which can suffocate the plant.

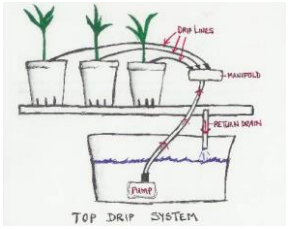
Ebb & Flow

An **ebb & flow hydroponics system**, also known as a **flood and drain system**, is a great system for growing plants with hydroponics.

This type of system functions by flooding the growing area with the nutrient solution at specific intervals. The nutrient solution then slowly drains back into the reservoir. The pump is hooked to a timer, so the process repeats itself at specific intervals so that your plants get the desired amount of nutrients.

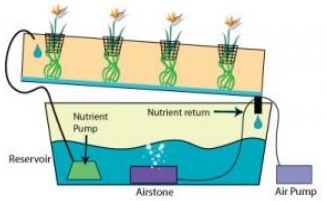
An ebb & flow hydroponics system is ideal for plants that are accustomed to periods of dryness. Certain plants flourish when they go through a slight dry period because it causes the root system to grow larger in search of moisture. As the root system grows larger the plant grows faster because it can absorb more nutrients.

Drip System



A hydroponic drip system is rather simple. A drip system works by providing a slow feed of nutrient solution to the hydroponics medium. We recommend using a slow draining medium, such as Rockwool, coconut coir, or peat moss. You can also use a faster draining medium, although you will have to use a faster dripping emitter.

The downside to a system like this is that the drippers / emitter 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 reason the system gets clogged is because particles from nutrients that build up in the emitter. Systems that use organic nutrients are more likely to have this kind of issue.



Hydroponics Worksheet

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

Advantages_____

_____

Disavantages_____

_____

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

_____

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

A. _____

_____

_____

B. _____

_____

_____

C. _____

_____

_____

D. _____

_____

_____

E. _____

_____

_____

4. What does the aquarium pump do in deep water culture? _____

_____

Use the word bank to fill in the blanks.

better	energy	energy	faster	greenhouse	indoors	nutrients
~~nutritional~~	oxygen	pesticides	search	taste	~~value~~	

1. It has been proven that hydroponic veggies are higher in nutritional value than field grown veggies.
2. Hydroponic veggies usually _____ _____than field-grown veggies.
3. If you are growing _____or in a_____, you can grow plants all year long.
4. The extra _____in the hydroponic nutrient solution helps to stimulate root growth.
5. The _____ for a hydroponic system are mixed with the water and sent directly to the root system. The plant does not have to _____in the soil for the nutrients that it requires.
6. The hydroponic plant requires very little _____ to find and break down food. The plant then uses this saved _____ to grow _____and to produce more fruit.
7. Due to lack of necessity, fewer _____are used on hydroponic crops.