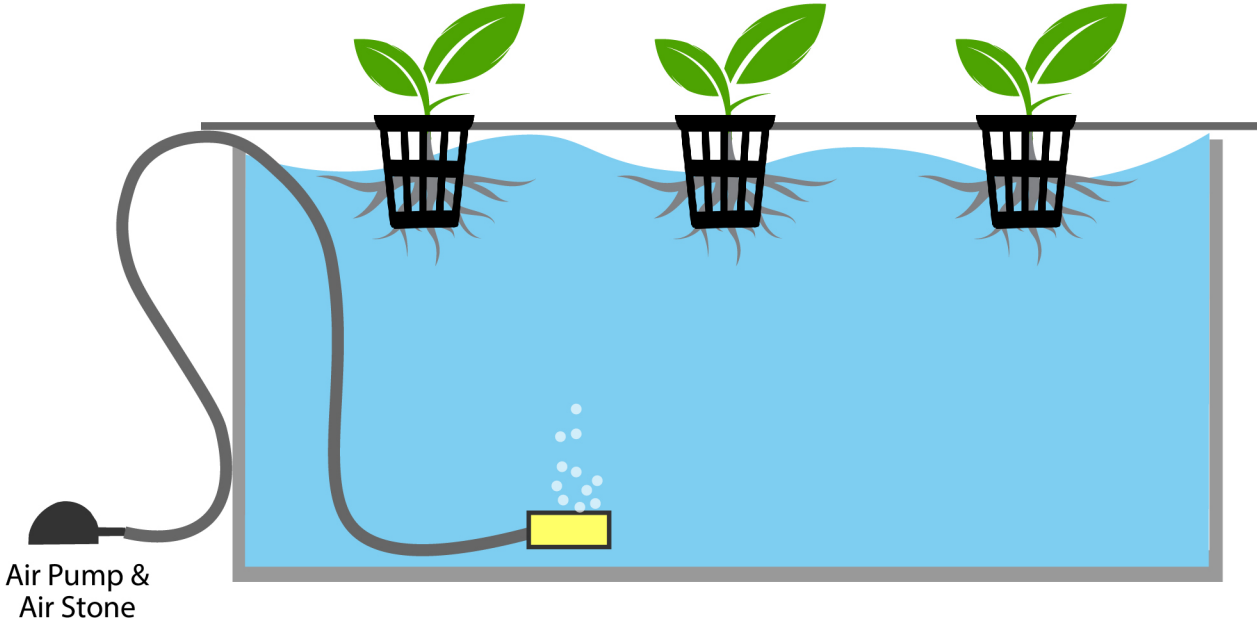




Hydroponics and Aeroponics DIY  
“Big Box” Kit





### The Basic Idea:

Deep water culture (DWC) is a hydroponic system that revolves around suspending plant roots in a nutrient solution reservoir. In this method, plants are typically placed in net pots or containers filled with an inert growing medium, like clay pellets or rockwool, and positioned above the nutrient solution.

The roots dangle down into the solution, where they are constantly submerged and aerated by air stones or bubblers. The roots absorb water and essential nutrients directly from the oxygenated solution, promoting rapid growth and high nutrient uptake.

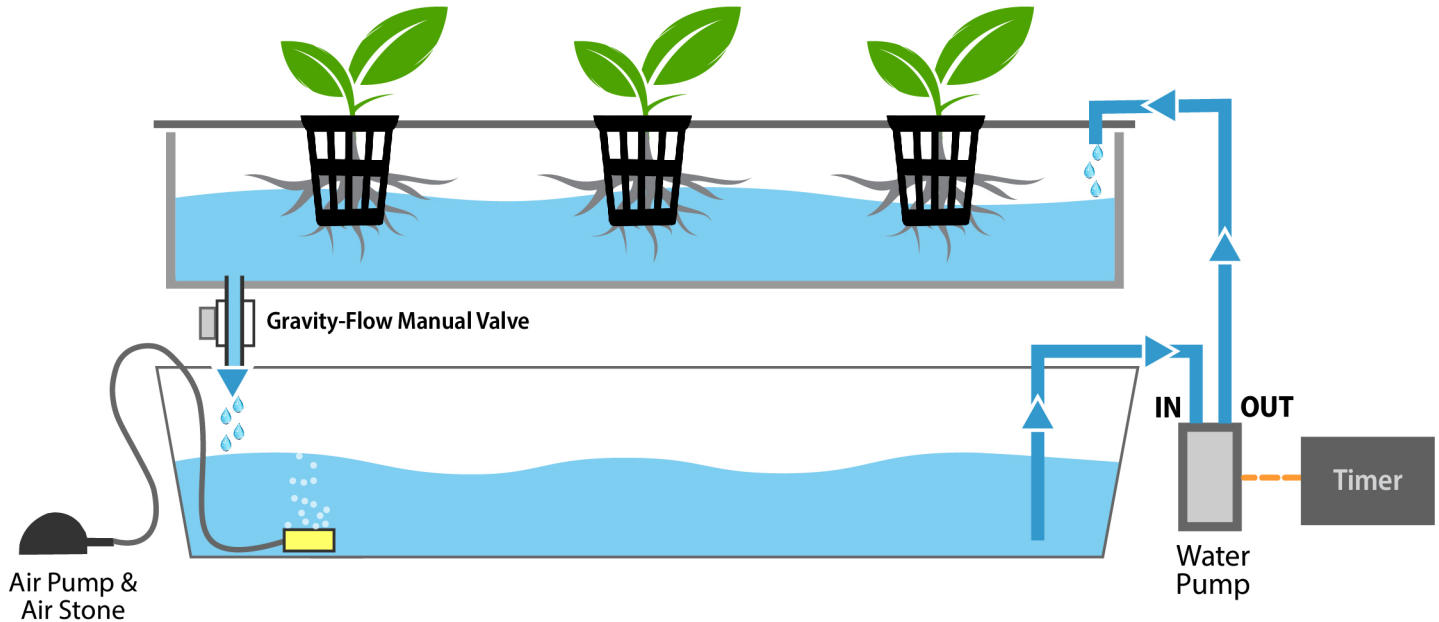
The continuous exposure to nutrient-rich water and ample oxygen supply encourages healthy root development and robust plant growth. The deep water culture system is known for its simplicity, efficiency, and ability to support a wide range of plant species, making it a popular choice for both beginner hydroponic enthusiasts and experienced growers.

| Advantages of Deep Water Culture  | Disadvantages of Deep Water Culture  |
|---|--|
| <ul style="list-style-type: none"> <li>• Very inexpensive and easy to make at home</li> <li>• Great for fast-growing plants like leafy greens!</li> <li>• Extremely low-maintenance</li> <li>• Recirculating, so less wasted materials</li> </ul> | <ul style="list-style-type: none"> <li>• Requires large amounts of water for nutrient solution</li> <li>• Does not work well for large plants</li> <li>• Does not work well for plants with long growing period</li> </ul> |

### Parts You Will Need from AG Big Box Kit:

1. Air Pump & Air Stone
2. USB Power Supply
3. 1 Diaphragm Pump
4. Net Baskets

# Ebb and Flow



## The Basic Idea:

Ebb and flow hydroponics, also known as flood and drain system, operate on a basic principle of periodically flooding the plant roots with nutrient-rich water and then allowing it to drain away.

This cycle of flooding and draining ensures that the plants receive an adequate supply of nutrients and oxygen while preventing waterlogging. The process begins with the nutrient solution being pumped or gravity-fed into the growing tray, where plants are typically situated in a growing medium.

After a set period of time, the excess nutrient solution drains out, allowing oxygen to reach the roots and preventing anaerobic conditions. This periodic irrigation cycle creates an optimal environment for plant growth and nutrient uptake, leading to healthier and more robust plants. Ebb and flow hydroponics offer a versatile and efficient method of cultivating plants without the need for soil, making it a popular choice for both hobbyists and commercial growers alike.

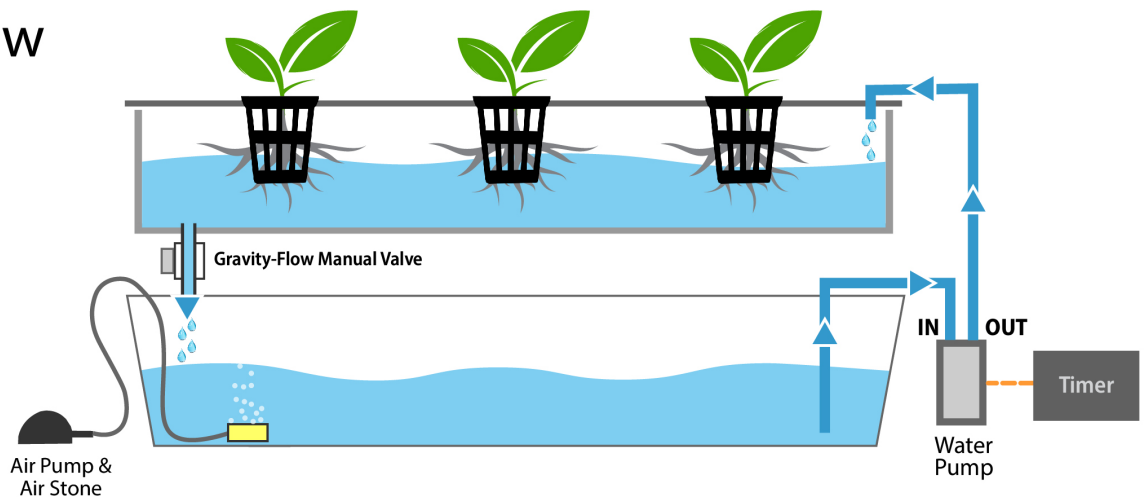
| Advantages Ebb and Flow   | Disadvantages of Ebb and Flow  |
|---|--|
| <ul style="list-style-type: none"> <li>• Very inexpensive and easy to make at home</li> <li>• Deep Water Culture Extremely low-maintenance</li> <li>• Recirculating, so less wasted inputs</li> </ul> | <ul style="list-style-type: none"> <li>• Can cause high humidity levels in grow area</li> <li>• Requires monitoring to ensure pump does not fail. Total loss if it fails.</li> <li>• Root Diseases: Root Diseases common to high-humidity conditions, such as Pythium root rot.</li> </ul> |

## Parts You Will Need from AG Big Box Kit:

1. Air Pump & Air Stone
2. USB Power Supply
3. 1 Pump
4. Net Baskets
5. ¼" Valve

# Ebb and Flow

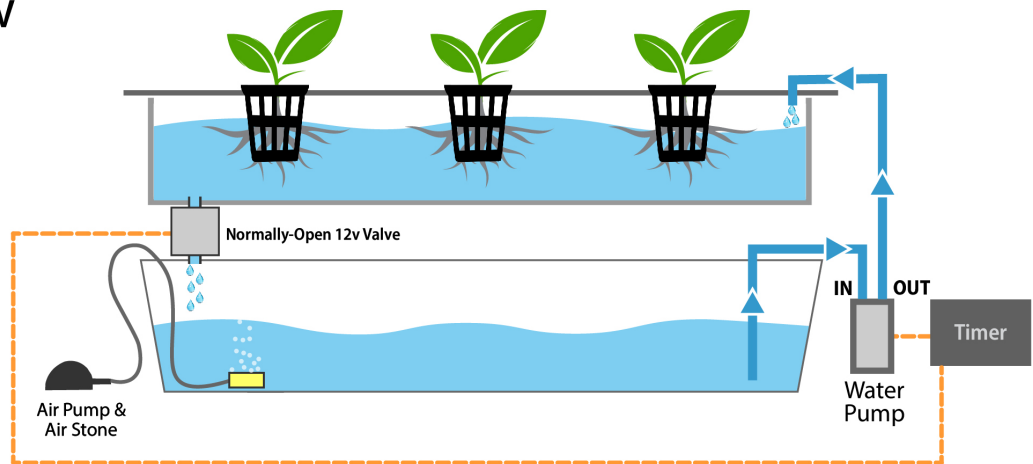
## Version 1 Gravity-Flow Drain



**Version 1** - The most basic ebb and flow system, relies on gravity to bring the nutrient solution back to the reservoir. A manual valve at the bottom of the grow tray helps regulate the drainage rate, which in turn allows for the grow tray to be completely filled with nutrient solution by creating a back pressure.

# Ebb and Flow

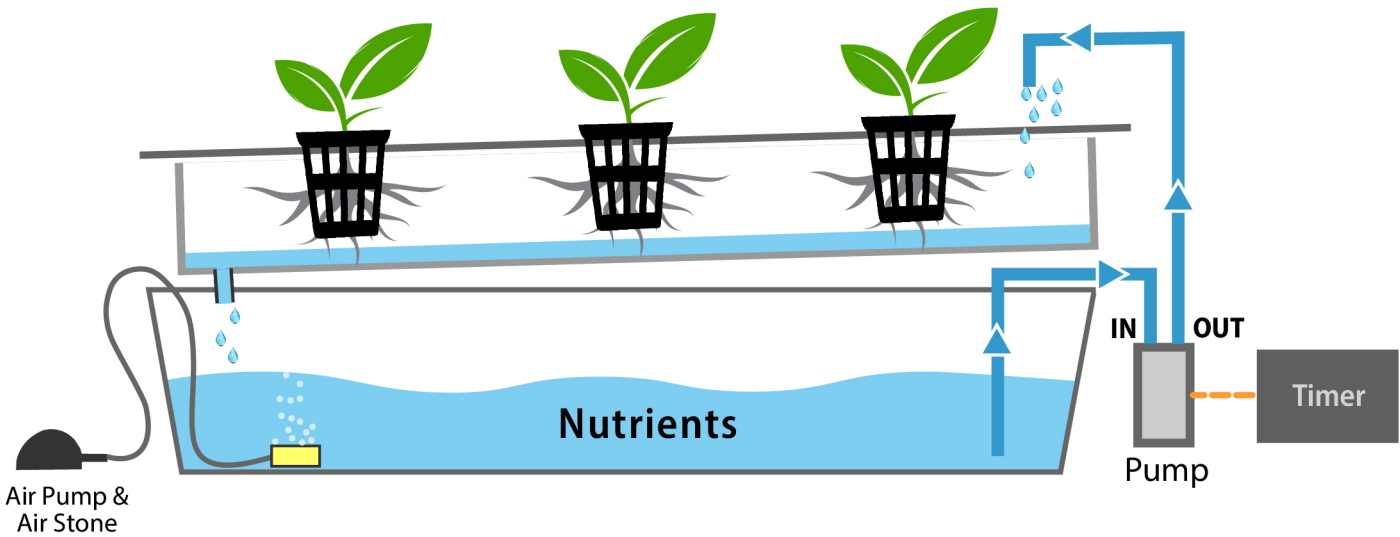
## Version 2 Normally-Open Electric Valve



**Version 2:** To manage the return process, a normally-open water valve is used. This electro-mechanical valve is less likely to clog because the drain opening size stays constant. The valve's mechanical action can help prevent blockages, depending on how the system is designed.

The normally-open (NO) valve is connected alongside the pump, which means that when the pump activates, the valve closes, allowing the reservoir to be filled with nutrient solution. At the end of the cycle, when the pump and valve switch off, the valve reverts to its normal open state, allowing the solution to drain back into the reservoir.

# Nutrient Film Technique



## The Basic Idea:

The nutrient film technique (NFT) is a hydroponic system based on a simple yet effective principle of continuously flowing a thin film of nutrient solution over the plant roots. In an NFT system, plants are typically grown in channels or gullies with a slight slope to allow the nutrient solution to flow down and nourish the roots.

The roots are exposed to a thin film of circulating nutrient solution, where they absorb the water and essential nutrients they need for growth. The excess solution then returns to the reservoir to be recirculated, ensuring a continuous and efficient delivery of nutrients to the plants.

This constant flow of nutrient solution maintains oxygen levels around the roots, preventing waterlogging and promoting healthy root development. The nutrient film technique is favored for its simplicity, efficiency, and ability to deliver nutrients directly to the roots, making it a popular choice for growing a wide variety of crops in hydroponic systems.

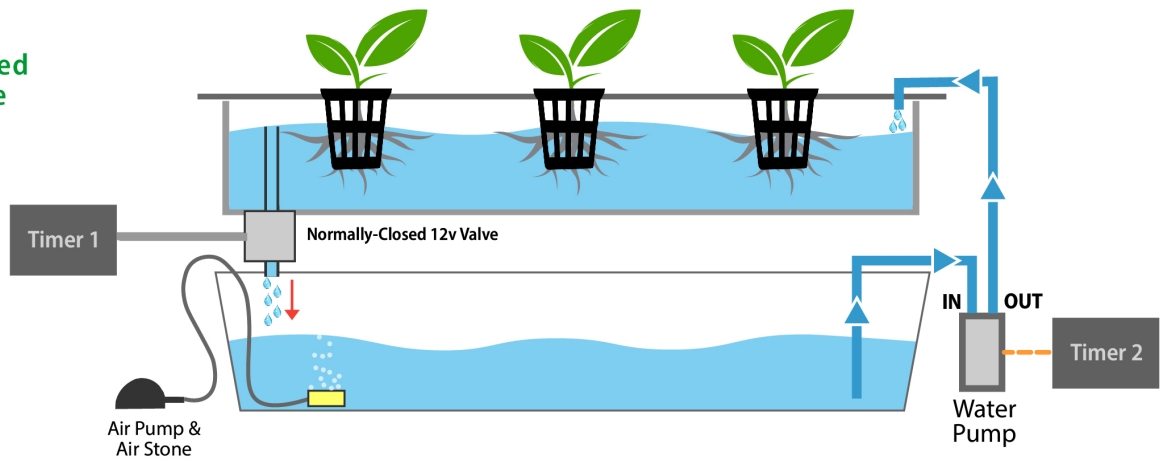
| Advantages of Nutrient Film Technique   | Disadvantages of Nutrient Film Technique  |
|---|---|
| <ul style="list-style-type: none"><li>• Minimal growing medium needed - light weight</li><li>• Efficient use of space = can be stacked vertically</li><li>• Recirculating system = less waste</li></ul> | <ul style="list-style-type: none"><li>• Pump failure of any kind can completely ruin your crop</li><li>• Roots can become overgrown and clog the channels</li><li>• If channels remain exposed, contamination can occur</li></ul> |

## Parts You Will Need from AG Big Box Kit:

1. 90 degree Quick Connect (x2)
2. Air Pump and Air Stone
3. USB Power Supply
4. 12v Diaphragm Pump
5. Programmable Timer
4. Net Baskets

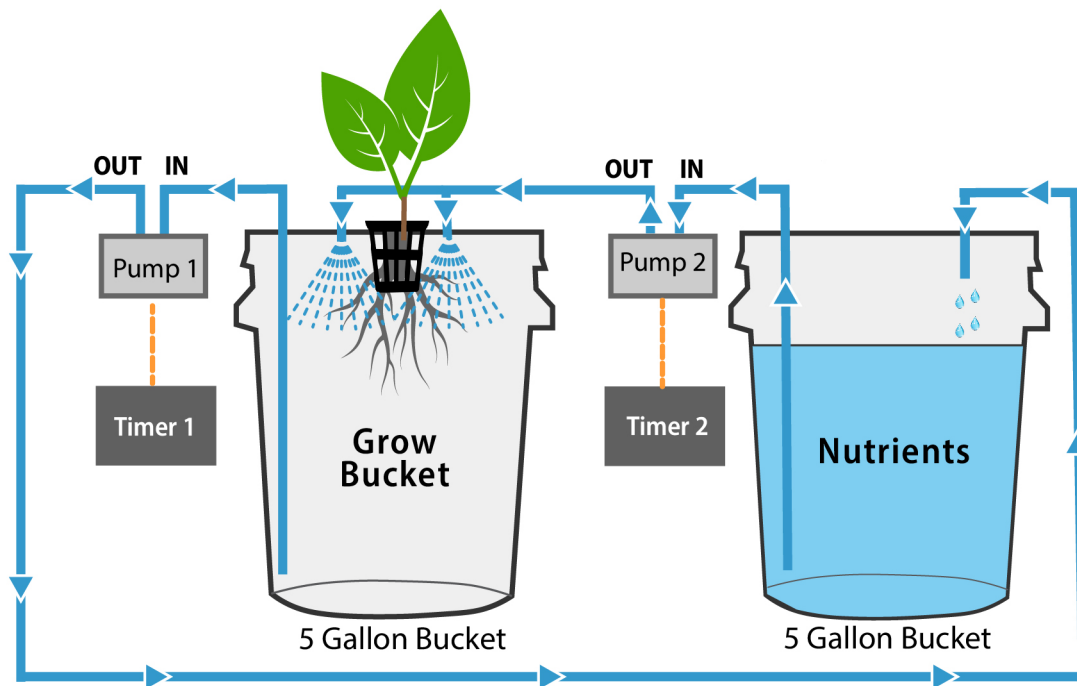
# Ebb and Flow

Version 3  
Normally-Closed  
Electric Valve



**Version 3:** A normally-closed water valve is opened and closed by its own timer, which allows for absolute control of the water cycling. You control the flooding, and you control the draining. This is a good choice for control freaks, wannabe “Grow Gurus” and budding mad scientists who crave total control! Mwahahahahahah!!!! :)

# Aeroponics



## The Basic Idea:

Aeroponics is a hydroponic system that operates by misting the plant roots with a nutrient-rich solution, providing them with water, oxygen, and essential nutrients. In an aeroponics system, plants are typically suspended in a chamber or tray, with their roots exposed to the air.

A high-pressure pump generates a fine mist or droplets of nutrient solution, which are then sprayed directly onto the roots at regular intervals. This method ensures that the roots receive optimal moisture and nutrient uptake while allowing them to aerate and absorb oxygen. By providing a highly oxygenated environment and direct access to nutrients, aeroponics promotes rapid growth, efficient nutrient absorption, and robust root development.

This innovative system is prized for its water efficiency, faster growth rates, and the ability to cultivate a wide variety of plants in a controlled and precise manner. Aeroponics is a popular choice for growers looking to maximize crop yields and optimize plant health in a soilless growing environment.

| Advantages of Aeroponics  | Disadvantages of Aeroponics  |
|---|--|
| <ul style="list-style-type: none"><li>• Uses 95% less water than soil-based farming</li><li>• Faster plant growth</li><li>• Higher Yields</li><li>• Uses space efficiently</li><li>• No pests</li><li>• No soil-based diseases</li><li>• No toxic pesticide chemicals</li></ul> | <ul style="list-style-type: none"><li>• Higher initial cost</li><li>• More complex than other systems</li><li>• Higher maintenance</li><li>• Risk of equipment failure</li><li>• Requires tuning to find proper feeding levels</li><li>• If channels remain exposed, contamination can occur</li></ul> |

# Aeroponics (cont)

## **Parts You Will Need from AG Big Box Kit:**

1. 90 degree Quick Connect (x3)
2. Rigid Tubing
3. 2 Diaphragm Pumps
4. 1 Programmable Timer
4. Air Pump & Air Stone
5. USB Power Supply
6. 12V Power Supply
7. Expanded Clay Balls