
HYDROPONICS

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*is the practice of growing plants using only water, nutrients, and a growing medium. The word hydroponics comes from the roots "**hydro**", meaning water, and "**ponos**", meaning labor, this method of gardening does not use soil.*

ADVANTAGES OF HYDROPONICS

- Grow crops where soil is unsuitable
- More control
- Faster growth rate
- Increased crop yields
- Use less water than soil grown crops
- Reduce soil related disease and insects
- No weeding

DISADVANTAGES OF HYDROPONICS

- Initial cost can be higher than soil culture
- Additional knowledge is needed
- Constant monitoring
- Disease spreads to all plants once it appears
- Water based micro-organisms
- Vulnerable to power outages

COMPONENTS OF A HYDROPONIC SYSTEM

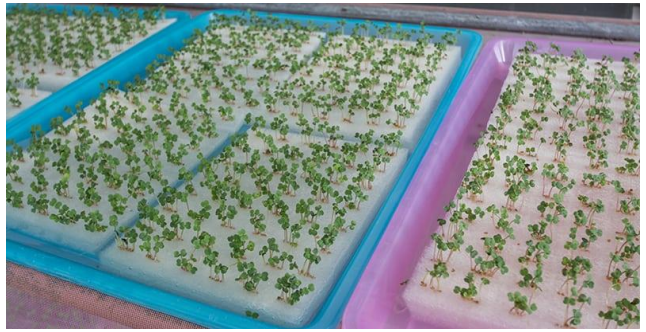
- Nutrient-rich solution
- Reservoir
- Growing tray
- Growing medium
- Submersible pump
- Air Pump (optional)
- Grow lights (optional)

NUTRIENT-RICH SOLUTION

THE MOST IMPORTANT PART OF THE ENTIRE SYSTEM IS YOUR HYDROPONIC NUTRIENT SOLUTION.

RESERVOIR

THE RESERVOIR IS THE LOWER TANK OR TUB THAT HOLDS THE NUTRIENT RICH WATER SOLUTION.



GROWING TRAY

ALSO KNOWN AS THE GROWING CHAMBER, THE GROWING TRAY IS WHERE YOUR PLANTS WILL BE.

GROWING MEDIUM

- The growing medium is what supports your plant and roots and helps absorb the solution and keep the plants moisturized

ROCKWOOL

- Inert, Sterile, Porous, non-degradable
- Made from melted Basalt rock and Chalk
- Provides firm root support
- Suited for seedling, cuttings and larger plants
- Manufactured in variety of sizes
- Requires a pre-soak to lower pH

EXPANDED CLAY

- Hydroton/Grow Rocks
- Lightweight, inert, pH neutral
- Made by heating clay to over 2000° F
- Air pores inside round pellets
- Reusable (Wash and sterilize)
- Not ideal for starting seeds
- Can get too dry if used in Ebb and Flow Systems
- Use alone or mix with other mediums such as peat or coir to increase drainage

COCONUT FIBER (COIR)

- Made from fiber just under the green husk that has been soaked to remove salts, natural resins and gums
- Biodegradable
- Natural pH is between 5.5 and 6.8
- Has good water holding capacity
- Available in a variety of sizes
- Compressed bricks can expand to 9 times original size
- Different Grades – be aware of salts and resins

PERLITE

- Volcanic glass expanded by heating
- Porous - allows water to drain
- Improves aeration
- Mix 1/3 with other substrate

VERMICULITE

- Mineral that breaks into small pebbles when heated
- Good water retention
- Ability to draw water upwards to plant roots
- Must balance water retention
- Good for Wick system

ROCK

- Pea Gravel, Lava Rock, River Rock
- Cost effective
- Start with clean rock
- Works well in Ebb & Flow Systems
- Easy to clean and reuse
- Sun or lights can heat rock and raise the temperature of the nutrient solution
- Heavy

NET POTS

- Containers placed in grow tray to hold growing substrate and plants
- Can be used in most systems
- Variety of sizes available
- Allows fast flooding

SUBMERSIBLE PUMP

- also known as a pump or nutrient pump.
- In most systems, this is how the nutrient solution gets from the reservoir to the plant roots.

AIR PUMP (OPTIONAL)

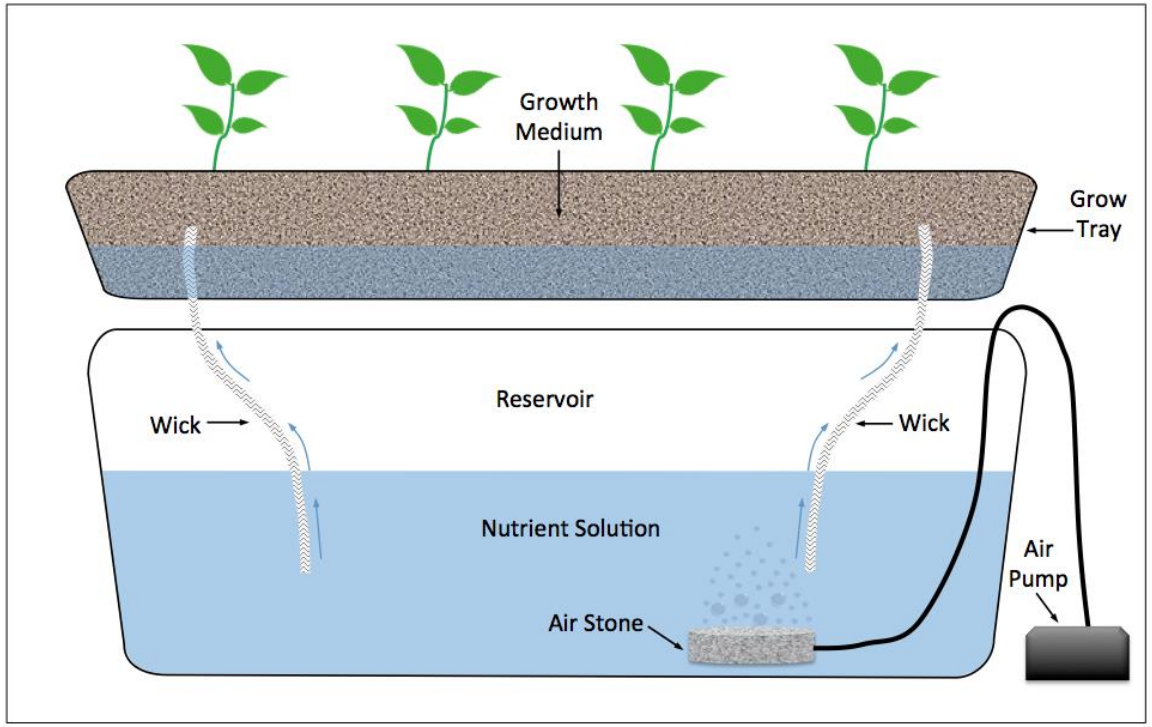
- The air pump provides oxygen to the nutrient-rich solution and, in some systems, to the plant roots.
- Oxygen is pumped through a line that connects to an **air stone** at the bottom of the reservoir, providing bubbles to your solution.

GROW LIGHTS (OPTIONAL)

- If you are unable to use natural sunlight, an indoor system will need to utilize an artificial light source: a grow light

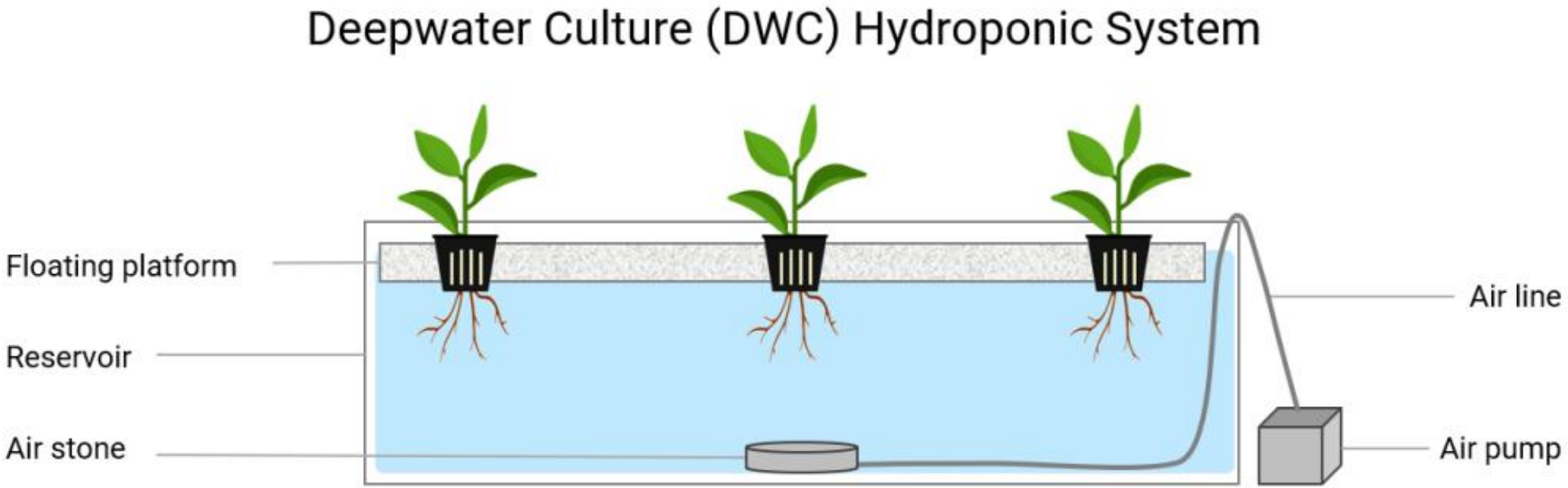
GROWING SYSTEMS

- Wick Systems
- Deep Water Culture (DWC)
- Nutrient Film Technique (NFT).
- Ebb and Flow (Flood and Drain)
- Aeroponics
- Drip Systems



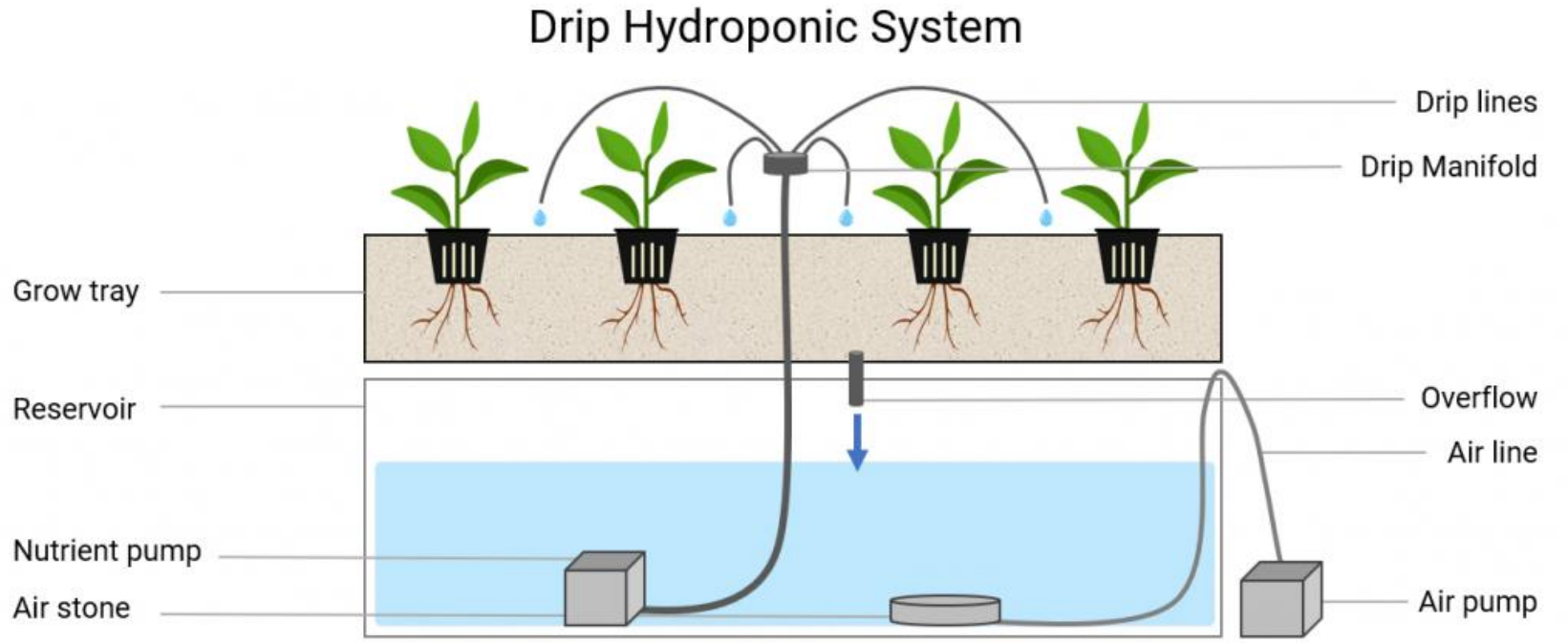
WICKING SYSTEMS

- A wicking system is the most basic type of hydro system you can build.
- With this system, a specific material acts as the “wick” that connects the plant roots to the nutrient solution.



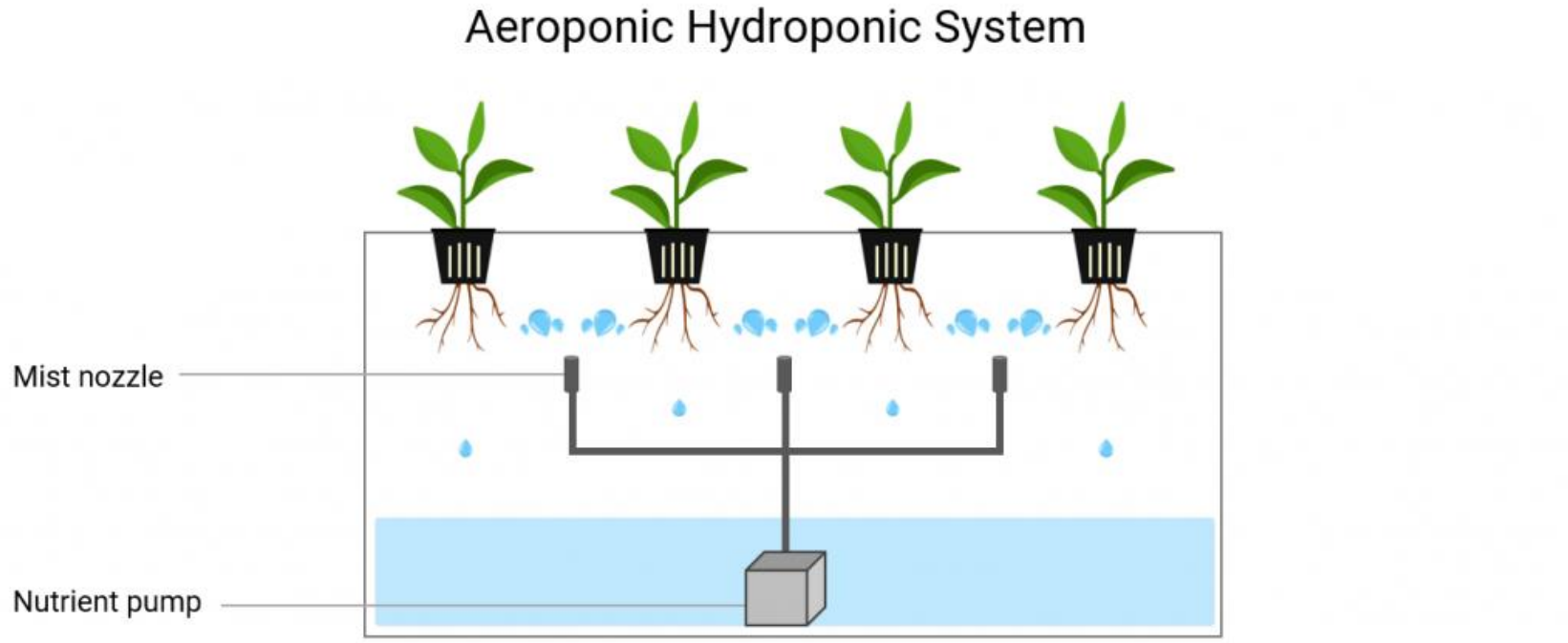
DEEPWATER CULTURE (DWC)

THE PLANT ROOTS ARE SUSPENDED AND HANG DIRECTLY DOWN INTO THE NUTRIENT SOLUTION.



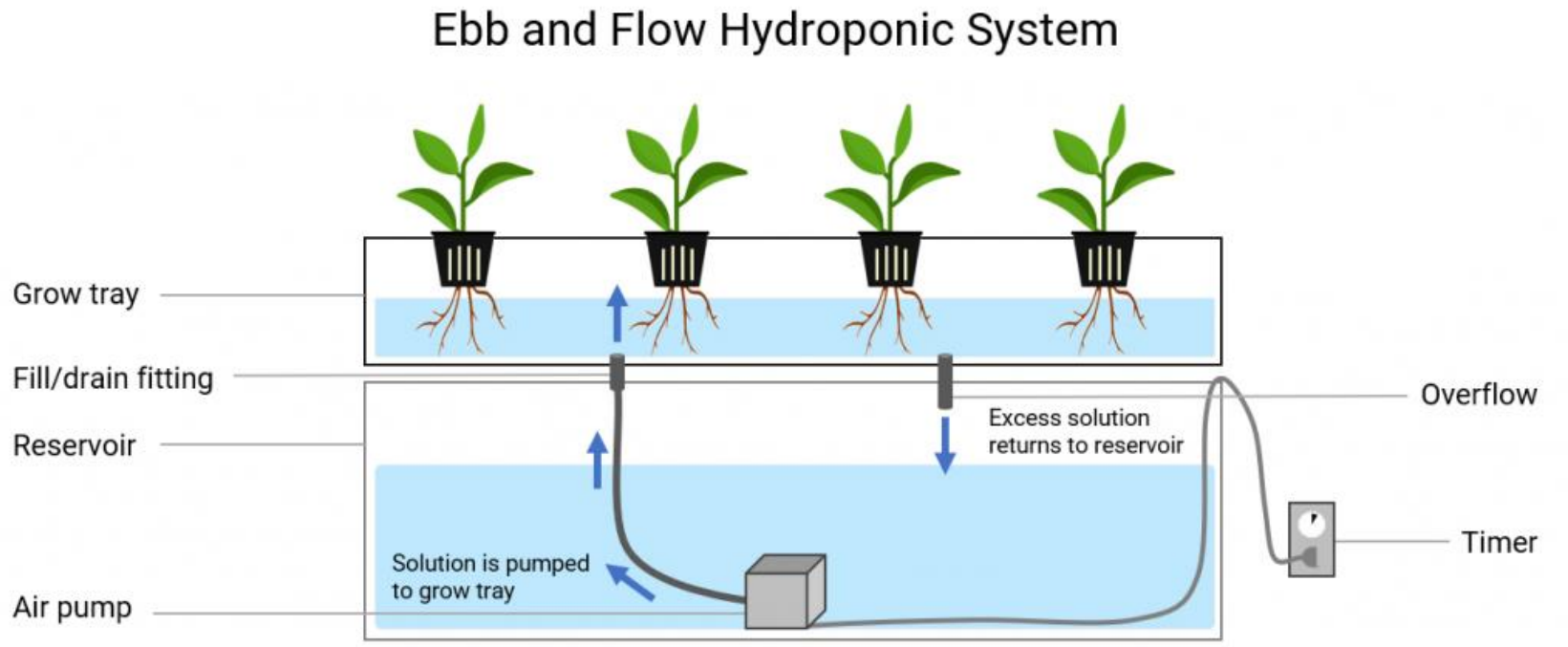
DRIP SYSTEM

- involves the nutrient solution being pumped through a tube above the plants which drips the solution down onto the plant and roots.



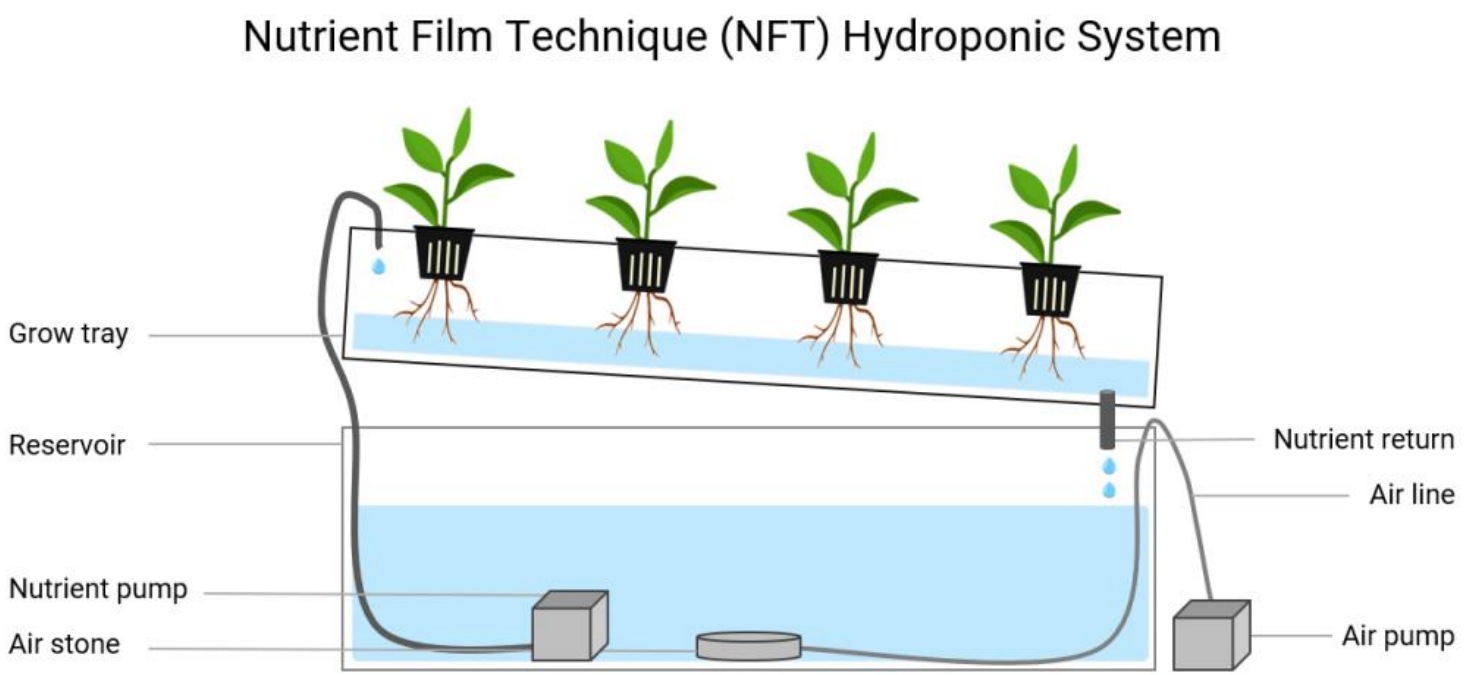
AEROPONICS

- a system where the plant roots are suspended and sprayed with nutrient-rich water.
- The nutrient spray effect is achieved using an aerosol or misting spray.



EBB AND FLOW

- also known as *flood and drain*
- involves a flooding reservoir that your plants sit in and is positioned above the nutrient reservoir water. The top tray with the plants gets flooded with the nutrient solution and then, in a specific interval, drains back down to the lower reservoir.



NUTRIENT FILM TECHNIQUE (NFT)

- a great option if you want to increase the oxygen levels and decrease the amount of water used.
- The key difference with NFT systems is that they rely on the plants to be suspended in a row at a slight tilt. This tilt allows for gravity to move the water through the tips of the roots.
- NFT brings in the most oxygen because the roots are almost entirely exposed to the air and only the tips of the roots touch the nutrient solution.