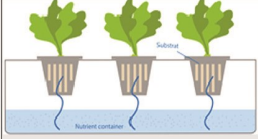
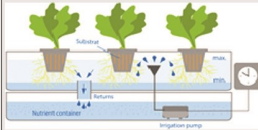


HYDROPONICS

System Design, and Operation



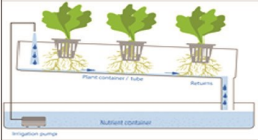
Wick Watering: Plants are grown in a substrate supplied with nutrient solution via capillary action of the wick.



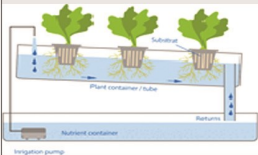
Ebb and Flow: This system involves the periodic flooding and draining of nutrient solution to supply plants with nutrients.



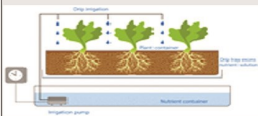
Deep Water Culture: A simple low-cost system where there is continuous suspension of plant roots in an aerated nutrient-rich solution.



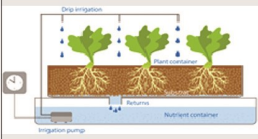
Nutrient Film Technique (NFT): The NFT uses a thin film of nutrient rich water to deliver nutrients to plants.



Deep Flow Technique (DFT): The DFT uses a deep flow of nutrient rich water to deliver nutrients to plants. This technique is suitable for areas prone to power outage.



Drip irrigation Non-Recirculating System: Nutrient rich solution is dripped onto the substrate around the plants via a drip line.



Drip Irrigation Re-Circulating: Similar to the non-recirculating system, however, nutrient solution is collected and returned to the plants via a pump.



Dutch Bucket: Used to cultivate long term crops; best suited for fruiting and flowering crops.



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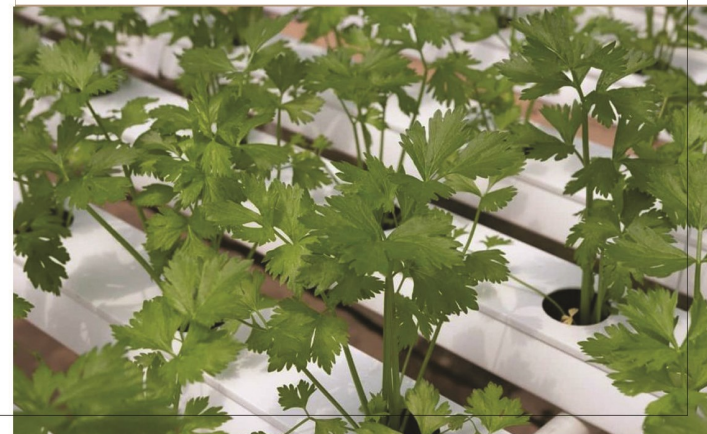
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HYDROPONICS





HYDROPONICS FARMING

Hydroponics is a form of protected agriculture where plants are grown without the use of soil. Hydroponics systems are designed to provide adequate support for growth and efficient supply of nutrients.

Distinct from soil, an inert growing medium is used to support plants. A nutrient solution is supplied to the system, and it generally consists of a measured combination of fertilizers necessary for healthy growth.

Factors to consider when designing a Hydroponics System:

CROP TYPE

Different crops require growing conditions for suitable optimal growth and yield. Some plant types lean on each other for support, others require space to open out. Some plants grow well in partial shade, while others require full sunlight.

GROWING SPACE

Choose a system type which best suits the crop: e.g. lettuce requires 26cm² space for root growth, however it's leaves will grow out to an area of 77cm² to 155cm², overall the system should provide space for plants to grow.

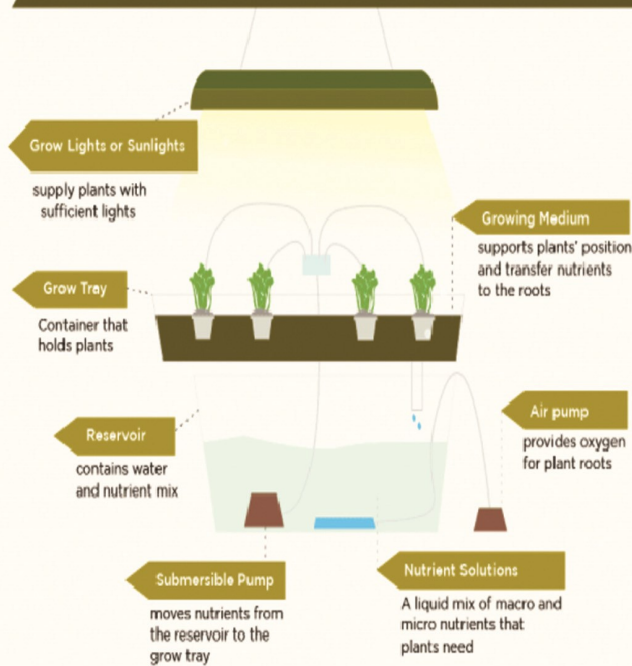
BUDGET

A budget will dictate how much can be grown. Hydroponics systems allow the flexibility of starting a system small, and scaling up to reach maximum output based on the space.

ERGONOMICS

Design a system with operation in mind. Take into account the space you will need to work in and around your system, how to reach crops to harvest, filling a basket with produce, or needing to move a cart around with items. Some plants will need to grow from the ground up, others can be elevated to alleviate bending which can lead to fatigue.

THE BASIC HYDROPONIC PARTS



GENERAL OPERATION OF HYDROPONICS SYSTEMS

• Growing Media

Growing media for hydroponics should be inert, or have a very low cation exchange capacity. Grow media suitable for hydroponics include rockwool, coco coir and cotton. Net cups may be used in conjunction with the grow media.

• Reservoir Maintenance

Eliminating light from the reservoir can help to discourage growth and reduce existing algae. Aeration of the nutrient solution in the reservoir is necessary to provide oxygen to plant roots as well as to minimize pH fluctuations in the main reservoir.

• Sanitation

When sanitizing the system after a cropping cycle, it is important to clean and flush all parts of the system. This can be done by sanitizing all components of the system with hydrogen peroxide or a bleach solution. Subsequently, the disinfecting solution should be rinsed thoroughly before mixing fresh nutrient solution.

• Nutrients & Water

Nutrients are provided through specifically designed hydroponic fertilizer formulations. The nutrient solution (fertilizer and water) should be monitored to ensure sufficient nutrients are available to plants.

• Measurements

The nutrient solution needs to be tested to ensure it is within acceptable levels. Critical test includes EC (Electrical Conductivity) and pH, thus pH and EC meters are essential for managing nutrient solution and understanding changes that occur as a result of plant interactions.

