

HYDROPONICS

Hydroponics :

Hydroponics is a technology for growing plants in nutrients solutions that supply all nutrient elements needed for optimum plant growth with or without the use of an inert medium such as gravel, vermiculite, rock wool, peat mass, saw dust, coir dust, coconut fiber(Coco peat) etc to provide mechanical support.

Benefits-

It provides Optimal & ambient conditions for plant growth hence there will be an high production and productivity.

- Efficient use of water and fertilizer.
- Reduces water consumption by around 80-90 %.
- Efficient control of soil borne diseases like root rot etc .
- Nematodes Problem in Poly house cultivation is completely ruled out.
- Safe Food Can be produced by using safe/ organic pesticides

Crops grown in hydroponics are:

- Leafy green Lettuce
- Icerberg Lettuce
- Broccoli
- Red Cabbage
- Zucchini
- Color capsicum
- Cherry Tomato/ Tomato
- White Brinjal
- Kale



Different types of Hydroponics:

1. Solution culture or Liquid hydroponics or active hydroponics :

- **Circulating methods (closed systems)**

Nutrient film technique (NFT)



Deep flow technique (DFT) or Deep water culture (DWC)



- **Non – circulating method (open systems)**
Root dipping technique



Floating technique (Ebb and flow)



Capillary action technique (Wick Method)

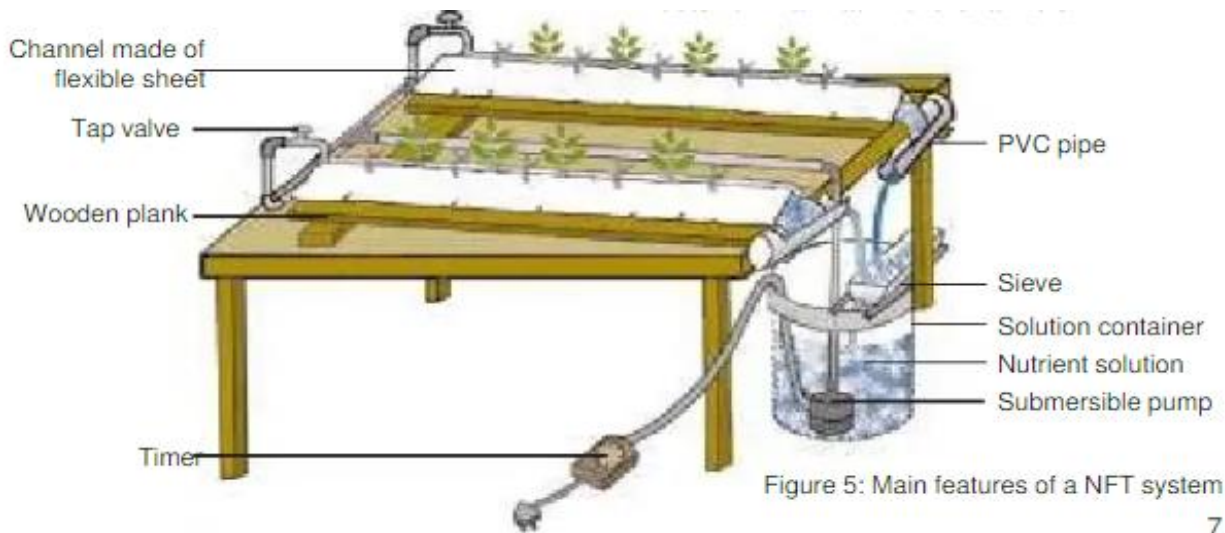


2. Solid media culture (Aggregate systems) or passive hydroponics :

These can be open systems or closed systems

- Hanging bag technique
- Grow bag technique
- Trench or trough technique
- Pot technique

NFT: (Nutrient Film Technique)



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NFT is a true hydroponics system where the plant roots are directly exposed to nutrient solution. A thin film (0.5 mm) of nutrient solution flows through channel.

The main features of NFT systems are:

The channel is made of flexible sheet. The seedlings with little growing medium are placed at the centre of the sheet and both edges are drawn to the base of the seedlings and clipped together to prevent evaporation and to exclude light. The cross section of the channel. The growing medium absorbs nutrient solution for young plants and when the plants grow the roots form a mat in the channels.

Nutrient Solution for Hydroponics:

- All essential nutrients are supplied to hydroponics plants in the form of nutrient solution, which consists of fertilizers salts dissolved in water. The hydroponic grower must have a good knowledge of the plant nutrients, as management of plant nutrition through management of nutrient solution is the key to success in hydroponic gardening.
- These 17 essential elements are divided into macro elements (required in relatively large quantities) and micro or trace elements (required in considerably small quantities).
- The macro elements are carbon (C), hydrogen (H), Oxygen (O), nitrogen (N), phosphorous (P), potassium (K), calcium (Ca), magnesium (Mg) and sulphur (S). The Micro elements are iron (Fe), chlorine (Cl), boron (B), manganese (Mn), copper (Cu), zinc (Zn), molybdenum (Mo) and nickel (Ni).
- As the nutrients are present in ionic forms in the nutrient solution and also, not needing to search or compete for available nutrients as they do in soil, hydroponic plants reach maturity much sooner. Optimization of plant nutrition is easily achieved in hydroponics than in soil.

Nutrient Solution Management:

- The success or failure of a hydroponic garden therefore, depends primarily on the strict nutrient management programme. Carefully manipulating the

nutrient solution pH level, temperature and electrical conductivity and replacing the solution whenever necessary, will lead to a successful hydroponic garden.

- The optimum pH range for hydroponic nutrient solution is between 5.8 and 6.5.
- Nutrient deficiencies will become apparent or toxicity symptoms will develop if the pH is higher or lower than the recommended range for individual crops.
- pH is consistently 7.5, one can expect intra – veinal chlorosis to occur, an indication of iron deficiency.
- When plants absorb nutrients and water from solution, pH of the solution changes. Therefore, it must be monitored daily.

Electrical conductivity (Ec):

- Strength of nutrient solution, as measured by an Ec meter.
- The ideal Ec range for hydroponics is between 1.5 and 2.5 dS/m,
- Higher Ec will prevent nutrient absorption due to osmotic pressure and lower Ec severely affect plant health and yield.
- If Ec is higher than the recommended range, fresh water must be added to reduce it. If it is lower, add nutrients to raise it