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Hydroponic Farming

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Hydroponics is the technique of growing plants using a water-based nutrient solution rather than soil, and can include an growing media, such as vermiculite, coconut coir, or perlite. “Hydro” (water) and “Ponos” (labour), Hydroponics literally means “water working”. The term essentially refers to a method of growing crops without soil. Hydroponic plants, however, get all the required nutrients from a water solution medium, hence the presence of soil becomes unnecessary to its survival. One of the major benefits of hydroponic farming is that this method can be used in small- as well as large-scale settings. People who do not have a large space, such as those that live in apartments or those that do not have a garden, can successfully use hydroponics to grow plants.

Although hydroponics is gaining positive traction among growers for providing a sustainable way of cultivating food, there are some plants that do not grow properly in a hydroponic setting. These include those that have deep roots, like potatoes, plants that grow tall, and vines.

Nutrient Solution for Hydroponics

Plant nutrients used in hydroponics are dissolved in water and are mostly in inorganic and ionic forms.

Plant uptake of nutrients can only proceed when they are present in an available form for absorption, and in most situations, nutrients are absorbed in an ionic form. Ions are electrically charged forms of each nutrient, some are cations (positively charged) and others are anions (negatively charged). For example, nitrogen is absorbed as ammonium (NH_4^+ , a cation) or nitrate (NO_3^- , an anion);

pH Level of Nutrient Solution

The pH value of the nutrient solution greatly affects plants' growth. This is because the nutrients added to the nutrient solution are available for the uptake by the plant are soluble in water only at particular pH levels. The plants require a range of pH values to be maintained to ensure the availability of all the nutrients for uptake by the plants. Nutrient solution pH is typically managed between 5.5 and 6.5, and it seems to be a range where almost all hydroponically grown crops exhibit normal growth and nutrient uptake, and the optimum pH range for different crops grown hydroponically.

Types of Hydroponic Farming

Active System: An active system is where the roots of the plants have direct access to nutrients by water solution circulated through pumps. The active system uses pumps that move the nutrient solution from a reservoir to the roots. The excess solution that the roots can't absorb travels back into the reservoir.

Passive System: Passive system does not require a pump to circulate the solution. Instead, the plants are suspended in the solution which then reaches the roots via different methods

that rely on gravity, flooding, or capillary systems. This type of hydroponic farming is easy to employ since no pumps are involved.

The farmer, however, is required to change the water frequently. Moreover, the absence of pumps makes it easier for algae to grow, which could degrade the water quality.

Advantages

- Producing High-Quality Food for Higher Population
- Reduced Water Consumption
- Reduced Rate of Pest And Fungus
- Improved Yield
- Optimal Use of Area/Regional Diversity
- Time Saving System

Disadvantages

- High Set-Up Cost Reliance On Constant Power Supply/System
- High-Level Maintenance & Monitoring
- Susceptibility to Waterborne Disease Requires Special Expertise
- Debatable Nature of Organic Label

Conclusion

Hydroponic farming is an effective method of growing plants indoors, and has its own benefits in various ways. It helps growers produce nutrient-rich plants much faster without the use of pesticides.

Although it does come with certain disadvantages, its benefits outweigh the drawbacks. With proper knowledge and use of renewable sources of energy, individuals, firms, and communities can use hydroponics to grow disease-free plants all year round.

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