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Popular Article

Nutrient Film Technique: An Innovative Hydroponics Approach

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Hydroponics

In recent years, there has been a significant shift towards advanced farming techniques among modern farmers. Techniques such as hydroponics, aquaponics, vertical farming, and greenhouse cultivation are gaining widespread attention. These new methods are considered safer, more efficient, and more profitable compared to traditional farming practices. Farmers are increasingly curious about and willing to adopt these modern agricultural methods. Among these techniques, hydroponics is rapidly becoming popular due to its numerous advantages.

Hydroponics is a method of growing plants using a nutrient-rich liquid solution, sometimes supplemented with artificial media, instead of soil. The term "hydroponics" is derived from the Greek words 'hydro' (water) and 'ponos' (labour). This method is particularly suitable for cultivating vegetables and ornamental plants and can be implemented on both commercial and domestic scales.

One of the most practical and widely discussed techniques in hydroponics is the Nutrient Film Technique (NFT). So, this article presents an overview of the

functioning, advantages, and challenges associated with the NFT system.

What is Nutrient Film Technique (NFT)?

The Nutrient Film Technique (NFT) represents a sophisticated approach within hydroponic farming, where plants are cultivated in a soilless media. A thin film of nutrient-rich water is continuously circulated over the roots of the plants, providing a constant supply of essential nutrients and promoting effective aeration. This technique is particularly effective because it delivers essential nutrients directly to the plant roots, which enhances growth rates of the plant compared to traditional soil-based cultivation.

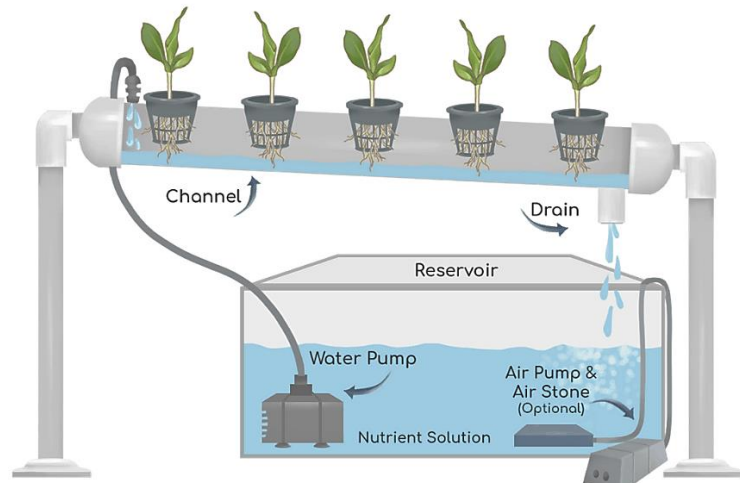
The fundamental principle of NFT involves recirculating a shallow stream of water, enriched with dissolved nutrients, across the plant roots. This method ensures that the plants receive a steady and balanced supply of the nutrients they need to thrive. Since a shallow depth of water is maintained, the roots are exposed to air as well as the nutrient solution, which improves aeration and prevents root rot, a common problem in other hydroponic systems.

NFT system setup

Plants in an NFT system are grown in channels made of UPVC or other materials, arranged in a parallel manner. Plants are generally held in net pots and placed in holes within the channel. The channels are slightly sloping to allow the nutrient solution to flow smoothly from one end to the other, which prevents stagnant water areas and ensures an even distribution of nutrients. This setup is essential for preventing the proliferation of harmful pathogens and ensuring that all plants receive adequate nourishment.

A storage tank holds the nutrient solution, which is pumped through the channels continuously. The use of a pump is crucial in maintaining the flow of the nutrient solution. As the solution flows over the roots, it provides nutrients directly to them, making the process more efficient than soil-based methods where nutrients must be absorbed through the soil matrix. The constant movement of the nutrient solution also keeps it well oxygenated, promoting healthier root systems.

The flow rate of the nutrient solution is an important factor in the NFT system. It must be carefully adjusted according to the length of the channels to ensure that all plants receive an adequate supply of nutrients without causing flooding or dryness at different points along the run of the channel. Proper flow rate management is essential for optimizing plant growth and ensuring uniform development of the crop.



Advantages of NFT Hydroponics

NFT hydroponics offers several benefits, especially in regions unsuitable for traditional cultivation, such as arid areas, cold climates, and urban environments. One of the major advantages is the reduced need for labour-intensive intercultural operations, such as land preparation and garden maintenance, which are common in conventional farming. Additionally, the absence of soil virtually eliminates weeds and soil-borne pests and diseases.

Another key advantage of the NFT system is its efficiency in water and nutrient usage. By recirculating the nutrient solution, the system minimizes waste and ensures that the plants have access to a consistent supply of nutrients. This recycling process not only conserves water but also reduces



the amount of fertilizers needed, making NFT a more sustainable option compared to traditional farming methods.

In addition, the system can operate with minimal water use, making it ideal for areas with water scarcity. It also allows for precise control of nutrient levels, pH and EC, which is crucial for optimal plant growth. Technological advancements have enabled the integration of environmental monitoring equipment with hydroponic systems, allowing automated control of nutrient dosing, pH, EC, temperature, and humidity. This automation minimizes water wastage and ensures consistent growing conditions, leading to higher yields and better-quality produce throughout the year. Vertical NFT systems are available these days with different designs (A-frame, hydroponic tower etc) where plants grow in a vertical structure. This vertical arrangement helps farmers/growers overcome space constraints, allowing them to achieve higher yields and greater profits from limited space. This makes vertical NFT an ideal solution for urban farming or regions with limited agricultural land.

Challenges of NFT Hydroponics

Despite its advantages, NFT hydroponics possess certain challenges. Ensuring the right balance of water and nutrients, along with maintaining the proper growing environment is a significant challenge for hydroponics growers.

Research is ongoing to develop accurate measurements and control mechanisms for factors such as pH, EC and nutrient dosing that influence crop growth. Although NFT hydroponics is currently used for crops like leafy greens and culinary herbs, there is potential to expand its application to a wider variety of crops in the future.

Another barrier in adopting NFT hydroponics is the high initial cost and the lack of experience among common farmers. However, providing proper skill development training and services through various agricultural institutions and research centres can help individuals master these skills.

Conclusion

The Nutrient Film Technique represents an advancement in hydroponic farming, offering a sustainable and efficient alternative to conventional agricultural practices. By overcoming space and resource constraints, reducing labour requirements, and ensuring high yields with better quality produce, NFT hydroponics is set to revolutionize modern farming marking a crucial turning point in agricultural practices. With ongoing research, technological improvements, and support from agricultural institutions, NFT hydroponics has the potential to make far-reaching changes in the mode of cultivation of food crops especially in unfavourable condition.